RAILROAD GAZETTE

FRIDAY, MAY 5, 1893.

CONTENTS.

ILLUSTRATIONS:	PAGE.
Servis Combination Tie Plate	329
Interlocked Switches and Signals—Boston & Maine Railroad, Boston	330
A Mallet Duplex Compound Locomotive	331
Tender Frame for Class Y Locomotive—C., C., C. & St. L. Railway	332
The Wadley Continuous Drawbar	332
New Patternmaker's Face Lathe	333
Combined Locomotive and Rock Crusher	334
Bridgeport Boring and Turning Mill	335
Tests of Locomotives in Heavy Express Service	335
Heilmann Electric Locomotive	337
Losses in Transmission of Heat	342
CONTRIBUTIONS:	
Lighting Pullman Cars	329
Scraps of Railroad Signal History	329
Defection of Ties on Bridge	329
More About the Patent Office	329
The Supreme Court Decision on the South Carolina Tax Cases	329

EDITORIALS:	PAGE
The Chicago Discussion on Compound Locomotives	338
The New York and Chicago 20-Hour Train	339
World's Fair Rates Again	339
Russian Railroads	339
Editorial Notes	338-340
New Publications	340
Trade Catalogues	340
GENERAL NEWS:	
Locomotive Building	345
Car Building	345
Bridge Building	345
Meetings and Announcements	345
Personal	346
Elections and Appointments	346
Railroad Construction	346
General Railroad News	348
Traffic	348
MISCELLANEOUS:	
Technical	343
The Scrap Heap	344
Through Passenger Traffic Between New York and Boston	331
A Charter of Recent English Railroad History	333
Indian Railroad Notes	337
The Opening of the World's Fair	340
Specifications	341

Contributions.

Lighting Pullman Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I recently started out of New York on a Pennsylvania train on which there were three sleeping cars and one dining car. The dining car and one sleeper were lighted with gas, and two of the sleepers with oil. In not one of these cars was the light fit to read by. It was, in fact, almost impossible to see to read ordinary print, and the man who tried to read for an hour was sure to fatigue his eyes more than any reasonable man should do. There was no lack of fine upholstery in the cars, the ventilation and heating were fairly good, the negroes were moderately civil, but the lighting was simply intolerable. It struck me as a curious thing that in the evolution of the sleeping car this one point of such great importance to the comfort of the traveler should have been so neglected. It may be that the Pullman company thinks that it ought to light the cars so dimly that people will not try to read at all, knowing how injurious reading on the cars is to the human eyes, with the best light; but I do not believe that the public wishes to have its eyes taken care of by the Pullman company in this way; it would rather have the privilege of amusing itself by reading during a long evening and being responsible for its own eyesight.

A CASUAL DRUMMER.

Scraps of Railroad Signal History.

27 *Bryanston Square*,
LONDON, W., April 18, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The very interesting paper in your issue of April 7 on the Development of Fixed Signals, by Mr. A. H. Johnson, recalls to my mind an anecdote told me by the late Mr. W. J. Williams, Traffic Superintendent of the Brighton Railway, as to the origin of the notch, now universally distinguishing distant signals from home signals. He was a man of great ingenuity, and he thought himself one day that a distant or caution signal ought to be different from a home or absolute stop signal. So he told one of his people to cut a notch out of the end of the distant signal at Caterham Junction (now Purley), a station on the main line between London and Brighton. The Brighton tracks are at this point used under Parliamentary sanction by the South Eastern Company, and two or three days after the notch had been cut he received an indignant letter from the South Eastern Company, asking why he allowed his signals to get into such a state of disrepair that large pieces were actually chipped out of the ends of them!

Mr. Williams also told me the origin of that invaluable device, Annett's key. One day he was considering the question of a siding near Dorking which was too far from the station to be protected by the ordinary signals. So he said to Annett: "Could you not cut a piece out of the lever which works the signals in such a way that when out the lever cannot be pulled over, and we might make this piece into the key of the padlock for the siding?"

I daresay other great men may have invented the notch and key at the same time, but I know Mr. Williams to have been a man of the most scrupulous exactitude.

T. C. FARRER.

Defection of Ties on Bridges.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your abstract, April 7, of Mr. Ritchie's paper on "Cross Ties for Railroad Bridges" in which the author suggests that experiments be made to determine the actual deflection of bridge ties: On p. 127, Vol. XXI, *Transactions* of the American Society of Civil Engineers, September 1889, will be found the record of a few tie deflection tests made by me in 1888. The rail used was of 70-lb. section, I regret only that my tests were few, and roughly made; and agree with Mr. Ritchie that there is here a field for valuable determinations.

W. H. BREITHAUPT.

The tests which Mr. Breithaupt refers to may be summarized as follows:

They were on a 175-ft. span of the Atchison bridge over the Missouri at Sibley, Mo. The ties rest directly on the top chords, which are 12 ft. 6 in. apart in the clear (14 ft. on centres), and the track, standard gauge, is in the centre, which brings each rail about 4 ft. inside the support of the tie. The ties were 8 in. × 14 in. × 16 ft., of white oak, spaced 14 in. between centres. The load was an American type engine with 32 tons on the drivers, the wheel base of which was 9 ft., and 18 tons on the truck. Downward deflection of centre of tie taken on three ties:

1st Tie.—Ordinary tie; rail bearings on it and on adjacent ties fair. Deflection with engine going at 15 miles an hour ..... ¼ in.
2d Tie.—Somewhat windshaky. One adjacent tie rail does not bear. Deflection with engine going at 20 miles an hour ..... 5/16 in.
Deflection with engine stationary ..... 1/8 in.
3d Tie.—A good tie; rail bearings on it and on adjacent ties good. Deflection with engine going at 20 miles an hour ..... 3/16 in.

Mr. Breithaupt also made one test on the viaduct, adjoining the bridge, where the ties were 10 in. × 10 in. × 12 ft. and spaced 16 in. on centres. The ties rested directly on the main girders, which were 10 ft. apart on centres and 9 ft. apart in the clear. The deflection on one tie, bearings fair, engine going at 20 miles an hour, was 3/32 in.

More About the Patent Office.

TO THE EDITOR OF THE RAILROAD GAZETTE:

About one half of the examining divisions of the Patent Office are two months behind their work, and one of the most important of all divisions is six months in arrears. This is not the fault of the examiners, as the evidence plainly indicates; but it is a hardship for inventors. Congress refuses relief, and work must be pressed through as rapidly as possible. Someone has estimated two hours and a half as the time allotted to the average case; and what is the result?

A patent is title to property. A title company will not declare a title except upon a careful examination and discovery of ample evidence. But the patent law requires the examiner to allow the claim, to grant the title, unless he discovers that it has been anticipated in a previous patent or printed publication; that is, if the claim, in his judgment, represents a real invention. If time is not allowed the examiner to make proper search he has to pass the claim on the want of evidence against it, and it becomes a patent. One may find on original claims in the Patent Office pencil notes of references accidentally discovered, after the patents had been issued, which would have destroyed the claims. There are important sections of the office in which examiners have no time to search the literature of the art, and it may be said that in general, so limited is the time for this work that probably the issue of patents could be greatly reduced by the employment of a sufficient force of examiners, and by a proper appropriation for the library. Broad and important claims in electricity have been found to have been anticipated by years in cases where persistent search or accident has rewarded a serious attempt at thoroughness.

The examiner must have time for a thorough study of the subject. Haste and the limitations imposed upon the office by inadequate appropriations not only tend to increase the number of patents, but to work injustice. Unless by the process of increasing the number of patents to such a degree that our patent system will gradually become similar to the English, it would seem difficult to discover how the present policy is to further the interests of those whom it is supposed to benefit.

X. Y. Z.

The Supreme Court Decision on the South Carolina Tax Cases.

CHARLESTON, S. C., April 29, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The South Carolina Tax Cases against the Richmond & Danville system in that state, pending before the Supreme Court at Washington for a month or less, have been decided against the state authorities and in favor of the receiver in whose charge the property has been held, by the appointment of the Federal Circuit Court, for several years past.

These cases have an interesting and important bearing on the authority of receiverships. The state authorities, under the Tillman administration, have been vigorously at work in the collection of taxes from corporations held hitherto to be bearing less than their legal share. In pursuance of this policy, assessments of disputed legality were made and forthwith the sheriffs were ordered to make collections on the increased basis at the usual rates. The difference between the amount of taxes hitherto paid and that chargeable by the new assessments represents the amount in dispute which the roads in question refused to pay. Three sheriffs levied upon passing trains of freight and other property of the roads in three different counties, chained the engines to the track and refused to release except on condition that the extra claim of taxes be paid. Application was immediately made to the United States Circuit Court, whose receiver held the property in custody, for an order to the sheriffs to release the property thus levied upon. Such order was served upon the sheriffs, who refused to comply, but still continued to hold the property for the claim of delinquent taxes owing to the state.

The failure to release was regarded by the court as contempt of its authority, for which Sheriff Tyler, of Aikin County, was imprisoned and fined $500, under judgment of the United States Circuit Court.

The case was appealed to the Supreme Court in the petition of Sheriff Tyler, for a writ of habeas corpus to release him from prison and fine.

The chief points in the decision rendered by Justice Fuller may be briefly summarized as follows:

1. That property in a receiver's hands appointed by a court is in *custodia legis*, and that unauthorized interference with such possession is punishable as contempt of court.

2. That, though this custody does not exempt property from imposition of taxes by the government in whose jurisdiction it lies, still this "does not justify physical invasion of such custody and wanton disregard of the orders of the court in respect to it."

3. That this levy by tax warrants would effect sequestration of property which was already in sequestration by being in possession of the receiver, and that while the tax lien must be regarded and executed, still the orderly administration of justice requires that it be done by and under the sanction of the court, and not in defiance of its mandates.

4. That, this being the ordinary rule in the state courts, its applicabilty to property in the custody of the United States courts is no less obvious, and that on this account, "whether the sheriffs were armed with a writ from the state court or the county treasurer, this property was as much withdrawn from his reach as if it were beyond the territorial limits of the state."

5. That the Circuit Court of the United States was acting confessedly within its jurisdiction in the protection of the property from unauthorized seizure, so that, by any legally unauthorized interference with property in possession of the judicial department of the state, and still more so that of the United States, sheriffs were necessarily acting in contempt. Hence, this could be in no sense construed as a case against the state.

6. That the levies were excessive, were previously decided by the court to be illegally made; that no leave of the court was sought in making the levy; that the operation of the road was obstructed persistently and release refused; that "such conduct was not to be tolerated, and that the court was possessed of full power to vindicate its dignity and compel respect to its mandates."

Much has been made of the principle of state's rights in this case, both in the press and in the argument of the plaintiff before the court. But the superior jurisdiction of the judicial authority over property held in execution seems to have been overlooked by the state authorities.

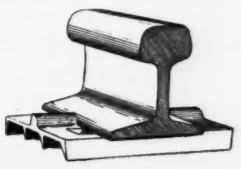
There is a right way and a wrong way to get what belongs to the state; and the sheriffs under the order of the Governor seem to have gone about the business in the wrong way and with undue haste.

The increasing exactions by state authorities, the growing expensiveness of operation and equipment, and the demands for greater speed are together heaping new responsibilities upon railroad corporations at the one end, and reducing the net returns at the other. Possibly this case opens the question whether much of railroad property would not be safer under a permanently established receivership, in which jurisdiction there is at least some apparent hope for a better protection than the ordinary state executive, with the lash of popular opinion at his back, is able or willing to give.

R.C.W.

The Servis Combination Tie Plate.

The Q & C Company has just brought out a new tie plate, which is shown in the engraving. It will be seen that it retains the distinctive feature of the Servis plate, that is, flanges on the bottom, and that moreover it is rolled with a rib on the top which provides a shoulder



inside and outside of the flange of the rail. The object was to preserve all that is most valuable in this plate by keeping the flanges, and to add the valuable feature of a shoulder plate; and to go still further and provide against the movement of the rail away from the outside shoulder.

The fundamental theory of the Servis plate has been to unite the plate with the tie so solidly that there should be no movement between the two. It is this movement which destroys soft ties, or any ties under heavy traffic, and one of the advantages of stiff rails is in diminishing just this motion. The flanges of the Servis plate being imbedded in the wood of the tie unite those two parts very securely. It is claimed by the designers

of this plate that rail braces or shoulders only on the outside fail in their purpose in that there is frequently a play between the rail and the brace or shoulder, and that the rails spring in advance of the wheels, particularly on curves, or that they spring in when relieved of the outward thrust of the wheel. This plate is intended, therefore, not only to prevent the wear of the tie, but to prevent the lateral movement of the rail, and to relieve the spikes from shearing or abrasion. With an adequate fastening to hold the rail down to the plate, this fixture would seem to be as complete as it can be made.

It will be noticed that this design necessitates making a special plate for each width of rail flange. Without the shoulder stops, the plate must be carefully punched for close spiking in order to get the best results; therefore, no new complication is introduced. It is proposed to leave about $\frac{1}{16}$ of an inch play to provide for a slight variation in the width of the flange.

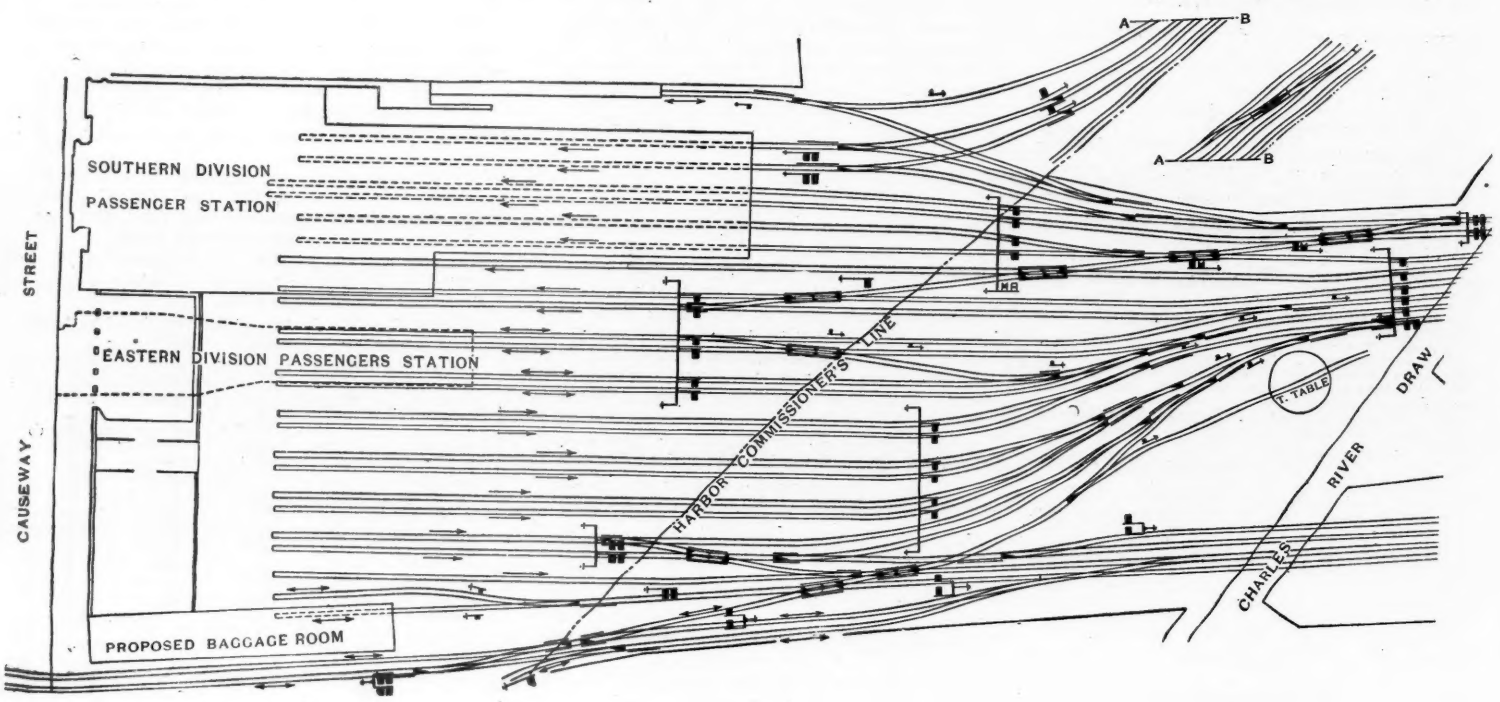


Fig. 1.

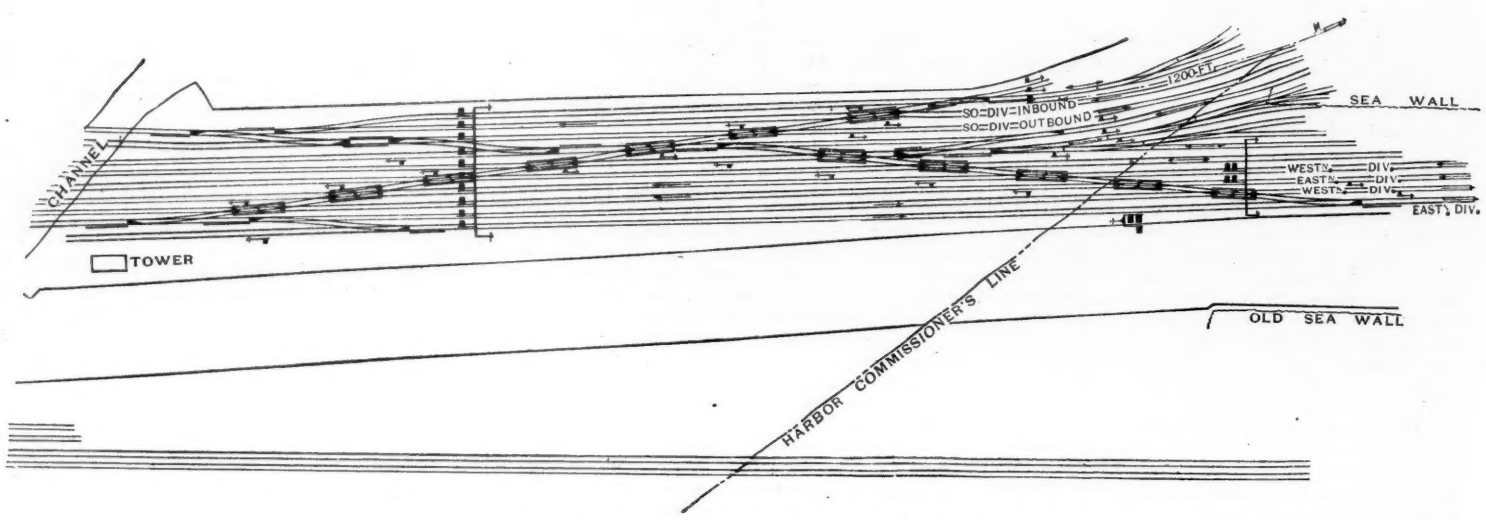


Fig. 2—Continuation of Tracks Shown in Fig. 1, Above.

INTERLOCKED SWITCHES AND SIGNALS—BOSTON & MAINE RAILROAD, BOSTON.

Union Switch & Signal Company, Contractor.

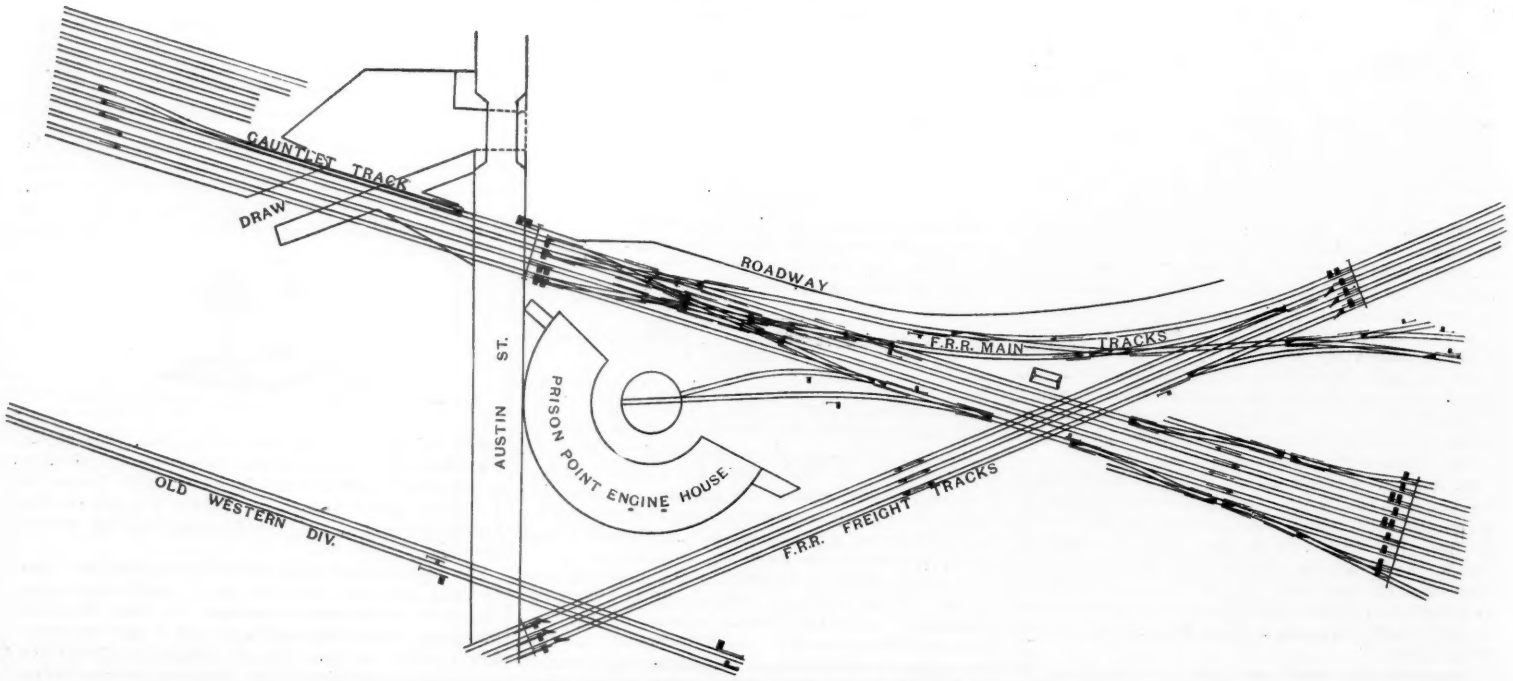


Fig. 3—Interlocking at Prison Point, Boston

Boston & Maine and Fitchburg Railroads.

Pneumatic Interlocking on the Boston & Maine.

The engravings show the lay out of the electro-pneumatic interlocking that the Union Switch & Signal Company is about to put in for the Boston & Maine at Boston. The plant at Prison Point, fig. 3, is built for the Boston & Maine and the Fitchburg jointly. This machine will have 30 working levers operating 23 single switches, 6 double slips with movable frogs and 1 single slip with movable frogs; or 49 switches and 7 sets of movable frogs. As each movable frog is equal to 2 switches this makes a total of 63 switches, with the necessary locks for them, and 82 detector bars, 29 semaphore signals and 12 dwarf signals.

The other plan, figs. 1 and 2, shows the arrangement of tracks and signals at the Causeway street terminus for the Boston & Maine. The machine at this point will have 55 levers operating 47 single switches, 3 double slips with rigid frogs, 17 double slips with movable frogs, 1 single slip with movable frogs, or 129 switches and 18 movable frogs, or, as each movable frog is equal to two switches, a total of 165 switches, with the necessary locks for them, and 207 detector bars, 80 semaphore signals, and 37 dwarf signals.

The installation at these points is to be put in complete by the Union Switch & Signal Company, including the necessary compressors, dynamo and storage batteries for their operation. The Causeway street tower will have a 24-track indicator to give information from the tracks and station to the operator when any train on its respective track is ready to move, and when any track is occupied.

The fact that such an extensive system of interlocking can be put in and scarcely cause notice or comment is an illustration of the remarkable growth in this part of the art of railroading within the last few years.

A Mallet Duplex, Compound Freight Locomotive.

The accompanying illustration shows a duplex, compound freight locomotive constructed upon the Mallet system, of which six were built and delivered in 1891 by J. A. Maffei, of Munich, to the Swiss Central Railroad. An order has lately been given to the same firm for 10 more engines of the same type. As shown by the illustration the whole weight of the engine, including coal and water, is carried upon the eight drivers which are arranged in two groups of four each, the rear group being actuated by the steam in the high pressure cylinders, while the front group receives power from the low pressure cylinders which are located just beneath the smoke-box. The locomotive therefore consists of two groups of twin engines, one for high, the other for low, pressure, both of which are arranged under a single locomotive boiler.

The high pressure engine with its framing is fixed to the boiler while the low pressure engine at the front end is made to swivel under the boiler. This permits the use of a fixed high pressure steam pipe leading from the boiler to the high pressure cylinder, the only movable pipes being that one connecting the two cylinder systems and forming the receiver, and the one leading from the low pressure cylinders to the atmosphere. The two steam engines are built with outside cylinders and valve motion. The front engine being made to swivel under the boiler, the framing of the locomotive is made in two distinct parts and the front framing coupled to the back by means of a strong vertical hinge. The back or main framing which carries the firebox, boiler and water tanks is curved upward and over the front engine and is carried thereon by suitable bearings which allow a free lateral movement of the front engine. In order to prevent too great a movement of this engine with relation to the main frame and to give it a tendency to return to a central position, check springs are provided which bear against a support underneath the smoke-box.

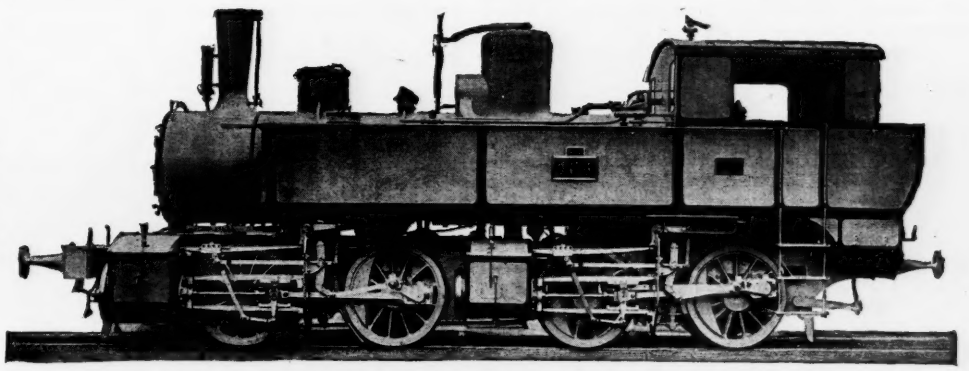
The valve motions are identical in all respects. The stationary links are of the "Walschaert" type; and as the cylinders are proportioned for an equal admission of steam, the reversing of the locomotive is effected by a single screw reversing gear to which a lever actuating the valve motion of the high pressure engine is connected. The valve motion of the low pressure cylinders is controlled through an independent reversing shaft and lever connected by means of an articulated tie rod with the high pressure valve motion.

As in all compounds of the Mallet type, high pressure steam is ordinarily admitted only to the high pressure cylinders, but if necessary the starting may be facilitated at certain positions of the pistons by admitting live steam to the receiver through the auxiliary steam cock. This is, however, rarely used in starting. The pressure in the receiver is limited to about 70 lbs. per square inch, there being safety valves provided to prevent the accumulation of a higher pressure.

The following are the principal dimensions of this engine:

Diameter H. P. cyls	13.97 in.
" L. P. "	21.65 "
Ratio of cyls.	1 : 2.4
Stroke	25.19 in.
Heating surface, firebox	87.18 sq. ft.
" " flues	1,165.31 "
" " total	1,252.47 "
Grate area	19.58 "
Diameter of drivers	50.40 in.
Total wheel base	20 ft. 4.9 "
Length over all	37 " 6.8 "
Service weight	60 tons
Water capacity	5 "
Coal capacity	2 "
Steam pressure	176.4 lbs.
Tractive power	15,000 "

Among the advantages claimed for this engine are its extreme flexibility as compared with any ordinary locomotive of equal weight and hauling capacity, and consequently a low internal friction and minimum wear and strain upon the permanent way, an even, steady turning moment at starting, and a fuel economy of 15 to 22 per cent.



A Mallet Duplex, Compound Locomotive.

Engines of the same system have been built by Maffei for various other lines in Switzerland. Among these are the engines for the St. Gothard Railroad with six axles in two groups of three each and weighing 85 tons. A collection of plans illustrating Mr. Mallet's designs of engines of this class will be shown in the exhibit of the Baltimore & Ohio Railroad at the World's Fair.

Through Passenger Traffic Between New York and Boston.

At the hearing before the Massachusetts Legislative Committee, in Boston, last week, Vice-President Tuttle, of the New York, New Haven & Hartford, gave some interesting statistics concerning the amount of passenger travel between New York and Boston, which we

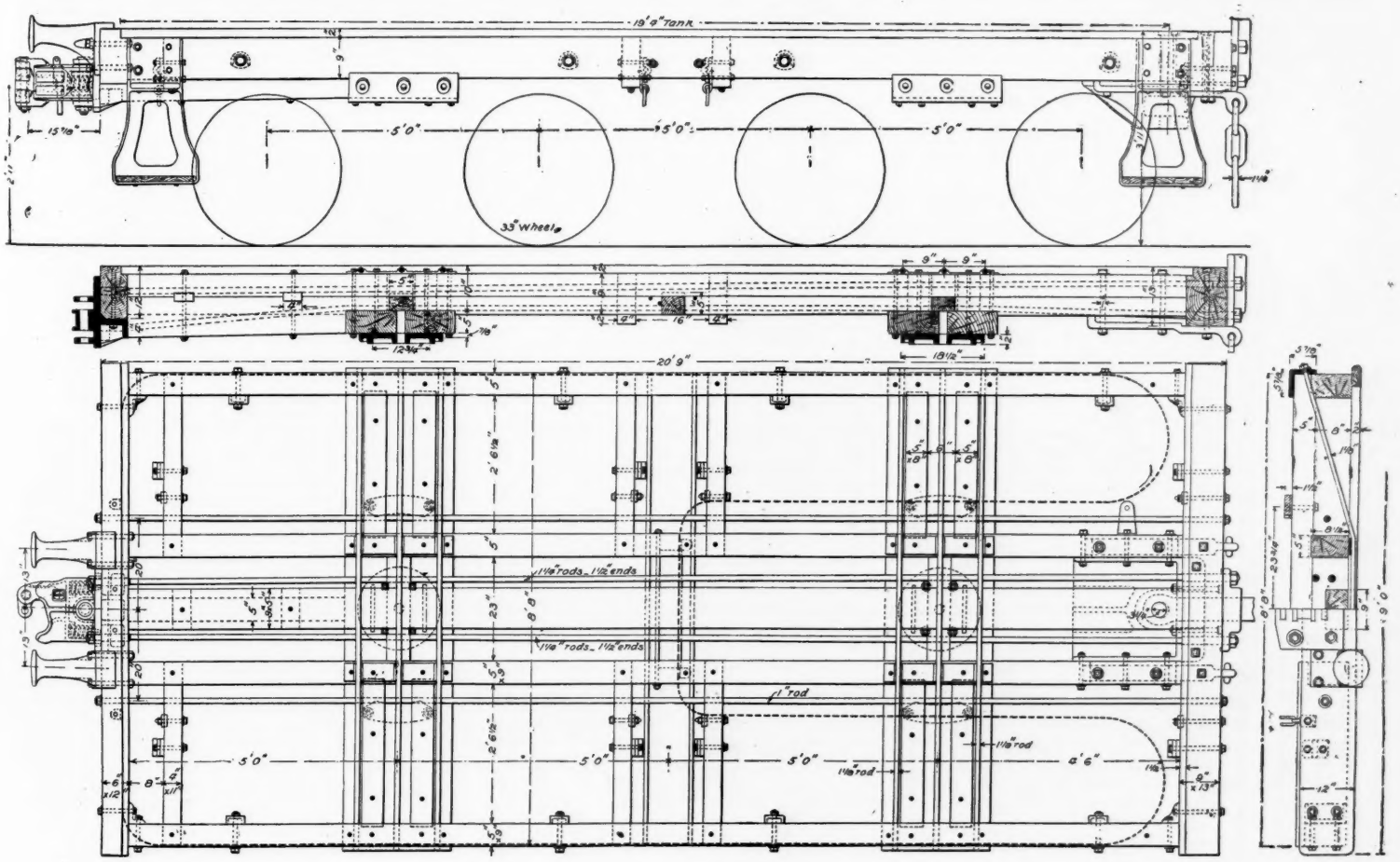


Fig. 1—Tender Frame for Class Y Locomotive—C., C., C. & St. L. Ry.

For description see next page.

summarize below. The figures show the average number of passengers through by each train each day:

Train leaving Boston at—	1890.	1891.	1892.
9 a. m., B. & A.	36.6	36	32.3
9 a. m., O. C. (Phila. train)	...	...	25
10 a. m., O. C.	36	39	36
11 a. m., B. & A.	42	41	31.4
12 m., B. & A. lim.	....	....	34.4
12 m., N. Y. & N. E.	18	16.7	10.5
1 p. m., O. C.	32	32	23
2 p. m., O. C. lim.	...	....	32.3
3 p. m., N. Y. & N. E.	56	63.6	58
4 p. m., B. & A.	36.8	32	38
5 p. m., O. C.	33.8	31	30.5
7 p. m., N. Y. & N. E. (Phila. train)	33	32	31.9
11 p. m., B. & A.	64.6	45.6	45.6
12 midnight, O. C.	65	69.4	77.1

These are, presumably, the averages of these trains, and of the *eastward trains* starting at the same hours, but Mr. Tuttle did not say so.

Mr. Tuttle called attention to the fact that since the 12 o'clock limited train had been put on, the New York & New England train starting at that hour carried only seven through passengers a day. The 3 o'clock train is the only unlimited train which runs through in less than six hours, and he pointed out that this carried more passengers in 1892, when it had the limited trains for competitors, than in 1890, when it had new cars, painted white and advertised as novelties. Mr. Tuttle says that the popularity of this train is largely owing to the hour at which it starts. The train leaving at 3 o'clock will secure a large share of passengers whichever road it runs over. A noticeable fact which Mr. Tuttle did not comment upon is the large increase in business on the Shore Line night train and the corresponing decrease on the night train over the Boston & Albany.

Mr. Tuttle's general object in presenting these figures was to show that the through business was not large enough by itself to support the trains, and that any increase in service would have to be adjusted so as to secure a part of its support from the intermediate towns and cities, and that therefore the more populous lines would secure the best service. Mr. Tuttle went on to give some figures concerning this intermediate business. These records are only for one year, ending March 1 last (the previous records having been burned), and they include the business from the New Haven road to and from points on the other roads (other than Boston) in both directions.

	Passengers.	Revenue of N. H. Road.
Exchanged with the N. Y. & N. E.	70,196	$240,046
Exchanged with the B. & A.	145,745	488,669
Exchanged with the Shore Line, east of New London, excluding Providence	224,664	667,764

In the cases of both the Boston & Albany and the Shore Line Mr. Tuttle showed that the eastbound business was heavier than the westbound. He explained this by the statement that the course of traffic on the boats on the Sound frequently causes violent fluctuations. It appears that on stormy nights many passengers take the cars who in pleasant weather would go by boat. If this is a true explanation it would seem that the stormy nights predominate in New York and pleasant nights in Boston. Mr. Tuttle said that the train from Boston to Washington over the New York & New England, leaving Boston at 7 p. m., was discontinued by the New Haven road because the express business was withdrawn, and the train could not be profitably run for the passengers alone.

Tender for Class "Y" Locomotives—Cleveland, Cincinnati, Chicago & St. Louis Railway.

In the *Railroad Gazette* for April 14, 1893, was illustrated the class "Y" locomotive of the C., C., C. & St. L. Ry., and in this issue is given the tender for the same class locomotive. This tender has some admirable features which are clearly shown by the illustration. It is the design of Mr. E. P. Lord, formerly Superintendent of Motive Power of the "Big Four." The late Mr. G. J. Worthington was Mechanical Engineer.

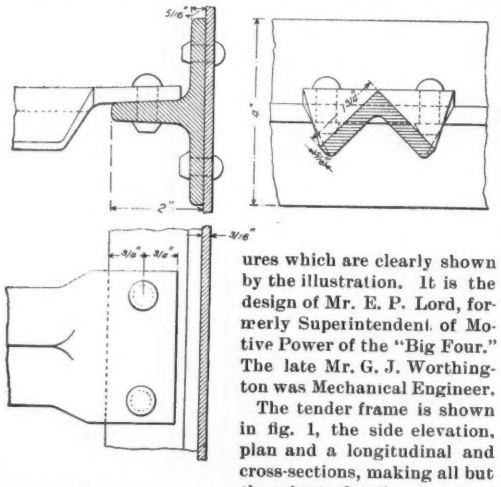
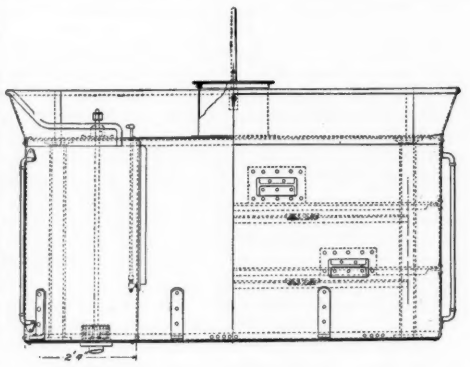
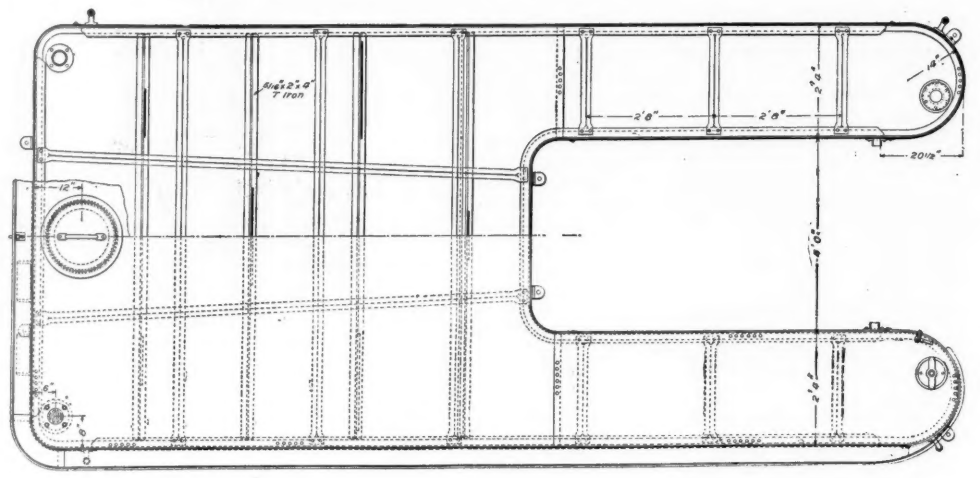


Fig. 4—Detail of Braces in Tank.

The tender frame is shown in fig. 1, the side elevation, plan and a longitudinal and cross-sections, making all but the minute details very clear. The frame timbers are 5 in. by 9 in. and of white oak. There is one centre sill extending from one end sill to the other, and placed with its shorter dimension vertical. Seven inches each side of this are two sills placed with the longer dimensions vertical; the outside sills are similarly placed. These sills are not mortised into the end sills, but are butted against them and held by means of cast iron knees fastened to both with ¾-in. bolts. There are four 1¼-in. rods with 1½-in. ends placed in pairs 6½ in. each side of the centre, and 3¾ in. apart vertically, by means of which the drawbar casting on the back end of the tender and the casting for the connecting link on the front end, together with the end sills, are securely held to the main sills. These rods also act as a continuous drawbar. There are two other rods 1 in. in diameter, placed 20 in. each side of the centre, which extend through both end sills. These, with the six cross truss rods, 1⅛ in. in diameter, bind the framing well together. The Janney buffer and coupler are used on the rear end of the tender.

The tender tank is shown in fig. 2. Its total length is 19 ft. 4 in., and width 8 ft. 8 in. The coal space is 4 ft. wide. The tank is strongly built and put together with angle iron corners. The top and bottom plates are ¼ in. thick and the side plates ⅜ in. thick; the plate around the coal space is ⅜ in. thick. The bracing is all of 1¾ in by 1¾ in. angle iron placed with the angle vertical. A very interesting feature of this tank is the arrangement of drain pipes, one in each rear corner, to drain water from the top of the tank. These pipes extend downward through the tank with an outlet below it. These keep from the foot plate most of the water spilled while filling the tank. The capacity of the tank is 4,000 gallons of water and of the tender seven tons of coal.





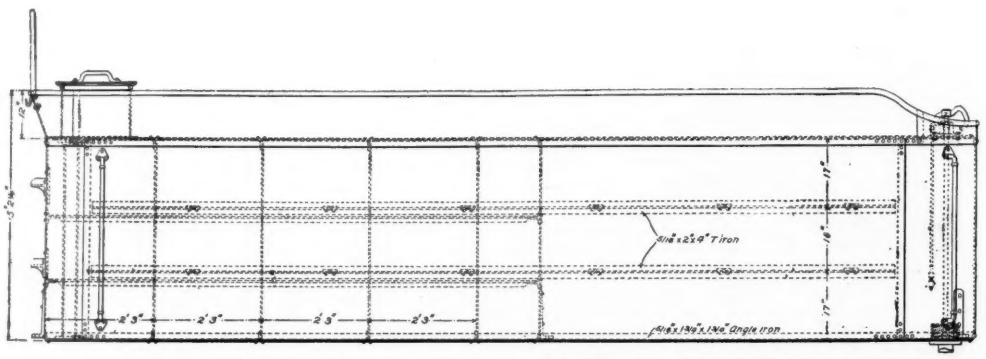


Fig. 2—Tender for Class Y Locomotive—C., C., C. & St. L. Ry.—Plan and Side and End Elevations of Tank.

The tender is carried on two 4-wheel, centre bearing trucks. The truck is shown in fig. 3. It is of the diamond pattern of bars 1¼ in. × 4 in. and ¾ × 4 in. The bolts through the ends are 1⅛ in. and through the corner plates 1⅜ in. in diameter. The bolster is made up of three pieces of oak, one 4 in. thick and two 3½ in. thick, and 8 in. deep, and of two wrought iron plates 1 in. thick and 7½ in. deep. The spring plank is a channel iron ⅝ in. thick and 15 in. wide and bolted to the cast iron corner plates by eight ¾-in. bolts at each end, thus holding the truck square. The truck is fitted with the Kewanee passenger car brakebeams, fitted with Christie head and shoe. The beams are equipped with wheel guards and safety hanger attachment. The springs are triple elliptic, 24 in. long, made of six plates 3½ in. wide and ⅜ in. thick. They are held in place by means of three ¾-in. steel pins driven into the channel iron and projecting into the band of the spring $\frac{5}{16}$ in. The Boies steel-tired wheels are used. These are 33 in. in diameter and dished 1¼ in.

The Wadley Continuous Drawbar.

The accompanying illustrations show the essential features of the Wadley continuous drawbar. As will be seen, the back end of the drawbar is provided at top and bottom with a strong lug which, in case of a breakage of the draft rod or spring case, strikes the stops shown, and keeps the coupler from pulling out. The draft rod has a taper just beneath the head, so that at the point where a tail bolt usually fails the cross section is considerably greater and the rod somewhat stronger than usual. Though shown in our cuts with the Butler attachment, the device can as well be used with any drawbar attachment permitting the use of a tail bolt. The draft rod corresponding to the tail bolt passes, however, beyond the drawbar attachment, and is joined at the centre of the car by a heavy turnbuckle which furnishes a convenient means of taking up the slack.

Figs. 1 and 2 show the form of drawbar end designed for use with this system. To arrange for the use of the

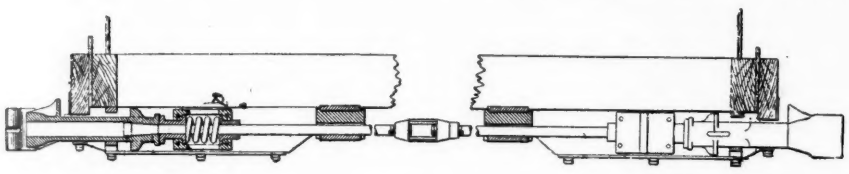


Fig. 1.

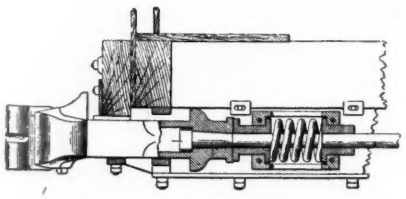


Fig. 2.

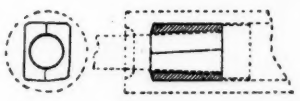


Fig. 3.

The Wadley Continuous Drawbar.

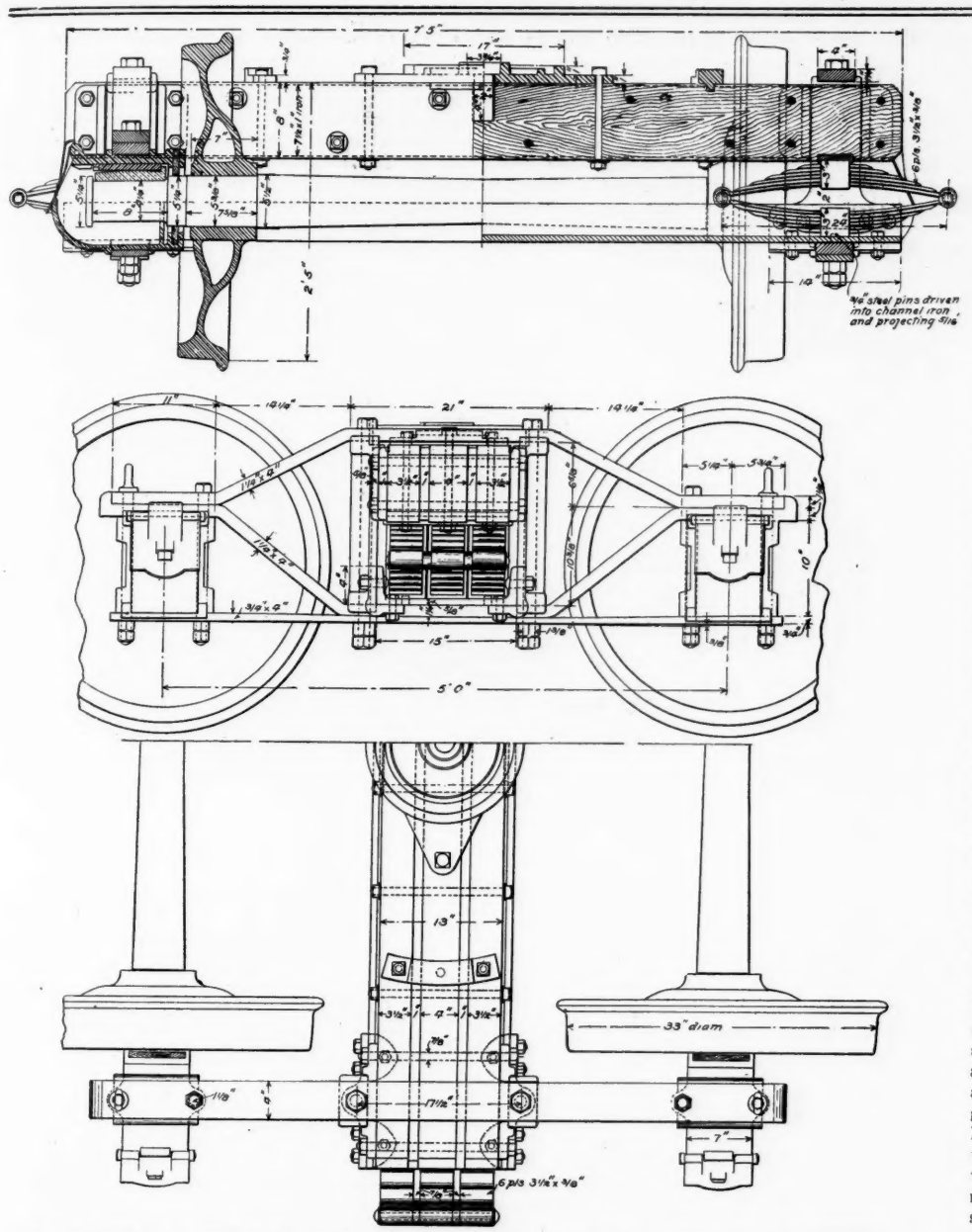


Fig. 3—Tender for Class Y Locomotive, C., C., C. & St. L. Ry.—Cross Sections, Side Elevation and Plan of Truck.

standard bolt on old equipment, malleable sleeves are used as shown in fig. 3. This drawbar can be applied to almost any kind of car, and is sold by the Wadley Continuous Drawbar Company, of Savannah, Ga.

New Patternmakers' Face Lathe.

The face lathe shown is of new design and intended for turning large circular work for use in car and railroad shops and wherever patterns are required of large diameters. It has a heavy frame, with a broad base, cast in the cored form, and it will swing material seven feet in diameter.

The spindle is made of steel, large in diameter, and carries a four-step cone. The bearings are long and self-oiling, and arranged to take up the wear. The front box consists of a babbitted split sleeve in which the spindle revolves, supported in the frame. The rear box has a conical step adjustable to the tapering bearing of the spindle by means of a screw. This screw has a separate adjustment, held to its place by a set nut, and comes in contact with the end of the bearing in a self-lubricating chamber. This furnishes the step with a constant supply of oil, and relieves the other bearing of friction.

The countershaft sent with this lathe carries a four-step cone to match the cone on the machine, and has two pair of tight and loose pulleys, securing eight changes of speed, to suit all sizes of work.

With each lathe the makers furnish three face plates—18 ft., 10 ft. and 6 ft. diameter, floor stand, rests, sockets, centres, countershaft hangers and pulleys.

Further information may be had of the makers and originators, Messrs. J. A. Fay & Co., Cincinnati, O.

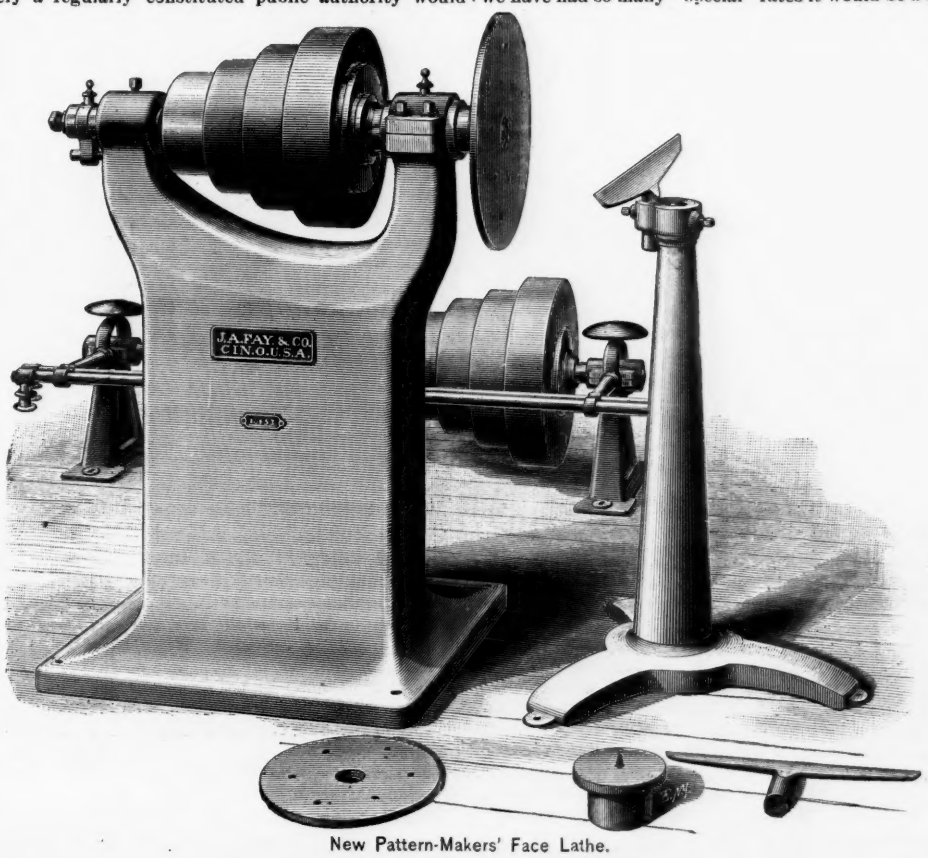
A Chapter of Recent English Railroad History.

BY W. M. ACWORTH.

In what Professor Hadley justly calls the brilliant book of Mr. Charles Francis Adams on the Railroad Problem, in the middle of an account of the stolid opposition of the American railroads to the granger legislation in its early days, there is this passage: "Imagine the English corporations thus coolly setting Parliament at defiance!" In Professor Hadley's own not less brilliant work on Railroad Transportation we read as follows: "The English companies have less to fear [than those of the United States] from sudden changes in legislation or sudden movements of public opinion. They can behave in an exasperating manner without endangering any of their well known rights. Such impudence as was displayed in the face of the early decisions of the Railway Commissioners would be all but impossible in America. An American road which should thus openly defy a regularly constituted public authority would raise a wave of public sentiment against it which would overbear all vested rights and privileges. There is always danger of a kind of public lynch law." Now, I have no wish to discuss how far these two utterances of high authorities are consistent with one another, or whether, if inconsistent, each of them may not have been true at the time when it was written. But I think a history of the railway rates question in England since the beginning of the present year should enable American readers to judge for themselves how far English railway companies are able to hold their own against Parliament and public opinion at the present time, and should, from that point of view, be not without interest.

It will be remembered that in 1888 Parliament decided that the classification and schedule of maximum rates for every railway in the country should be revised and re-enacted, and laid it down that from and after the revision coming into operation the revised rates and charges should "be the rates and charges which the railway company shall be authorized to charge and make." In accordance with the act of 1888 the railway powers of charge were submitted, therefore, to an exhaustive examination, and, after a hearing lasting for many months, revised schedules for the different companies were enacted by Parliament, some in the summer of 1891 and the rest in the summer of 1892. The companies were given to Dec. 16 to adjust their tariffs of actual rates in conformity therewith, and on Jan. 1, 1893, the new rates came into practical operation. And here is the point where the history begins to be interesting.

The new legislation meant nothing less than putting into the melting pot the entire freight rates of English railways. There was for the first time an exhaustive classification having the force of law. The respective treatment accorded to different trades and different localities was overhauled in the light of the new and more stringent undue preference clauses. The relation between owner's risk and carrier's risk rates was readjusted. Last and chiefly, the new maximum schedules implied in many instances serious reductions of existing actual rates; and the companies naturally looked about them to see where they could recoup themselves, and how far the traffic, in articles, or at points where the new maxima left a margin above existing rates, could bear an increase. Further, they took steps to withdraw a good many concessions which were of such long standing that they had come to be regarded by traders as legal rights. For example, free tickets for drovers accompanying cattle were abolished; sacks filled with grain were charged gross instead of net weight. Similarly coal was no longer to be reckoned at 21 hundredweight to the ton, but subject to a small allowance for wastage, at 20 hundredweight, like all other commodities. One point more must be added to make the story complete. English railways have always had unusually large proportions of what we call "special," and you, I believe, would call "commodity" rates. On some of our lines, as much as 75 per cent. of the total traffic has hitherto been carried at "special" rates—"special," be it however observed, only in the sense that they apply only to definite commodities and between definite points, for they are just as public, just as permanent and just as much available to the traffic of traders in general as the ordinary "class" rates. Why we have had so many "special" rates it would be a long



New Pattern-Makers' Face Lathe.

story to tell. The principal reasons probably are that our classification has, practically speaking, never provided for car-load rates; that our rates are always through rates for the entire distance, and we know nothing of your system of basing points and local differentials; further, that this is an old thickly populated country, with sea competition coming in on every side and with local centres of production and distribution lying close beside each other. In the revised rate books a vast number of the old "special" rates were at the outset conspicuous by their absence. The railway companies gave as the reason of this the undeniable fact that insufficient time had been allowed for completing the revision. But we may well believe that they had also felt a not unnatural disinclination to put back the old "special" rates into the rate book before it was conclusively shown that the trade must have them. In the interval, however, the wholesale traders would be liable to be charged the full rates of the ordinary retail traffic.

When, in compliance with the law, the new rate books were deposited at the stations for public inspection on Dec. 16, there were ominous mutterings. A fortnight later, when the new rates came into actual operation, the mutterings grew louder. By the end of January, when Parliament met, they had swelled to a furious storm. The columns of the daily press teemed with letters from indignant correspondents, with protests unanimously passed by Farmers' Alliances, Chambers of Commerce, and Traders' Associations all over the country; nor were there wanting leading articles, which endeavored—unsuccessfully, it must be admitted—to make up by the strength of their language—and it was very strong—for the blank ignorance of the elementary facts of the case which their writers displayed. Hardly a day passed without questions being asked or motions made in the House of Commons—the best barometer of the popular mood of the hour—on this burning subject. One straw may suffice to show how strong a breeze was blowing and in which direction. Mr. Mundella, a cabinet minister and President of the Board of Trade (the official head, that is, of the very department which was responsible for the authority being given to the railway companies to charge their new rates), was fairly carried off his feet by the force of the storm. In the beginning of February he exhorted the public to have patience, pointing out that, whatever the advances might be, there was "a vast volume of reductions of which the public hears nothing." A few days later he promised a deputation that waited on him that, if by the end of March the railways did not abandon the attempt to charge rates which his own department had fixed as reasonable, and which an act of Parliament had expressly empowered them to charge, he would be prepared "to submit to his colleagues in the government a measure which should have the effect of bringing the railway companies to their senses."

Now, I have no wish to discuss here the question how far there was a moral justification for this threat of "public lynch law" against companies which were undeniably within their legal rights. To American readers it can matter little whether the new rates, if they had been maintained, would have given to the companies a greater or a less or the same net revenue as they earned before. But one or two facts seem worth recording. They all have been published (it should be said) on the authority of the companies themselves. Presumably, therefore, they are not unduly unfavorable for the railway view of the case. Here they are. The Great Western, the leading agricultural line, analysed its new rates for cattle into London. As compared with the old, they gave 410 reductions against 210 increased. The greatest increase was 75 cents per truck; the reductions ranged as high as $6. The Taff Vale, the chief company in the coal mining district of South Wales, found that of its 91 most important rates for merchandise 71 were reduced, 19 raised, while 5 remained unaltered. The Great Eastern has almost a monopoly of the eastern counties of England. It has in force 16,401 goods rates from Yarmouth to interior points. Of these 1,830 were advanced, 14,571 lowered. The maximum increase was 60 cents, the maximum decrease $2.50. For fish, by passenger train, there were in force 737 different rates; 190 remained unaltered, 20 were advanced, 527 reduced.

These figures would seem convincing, but assuredly they utterly failed to convince. The traders and the agriculturists were suffering from bad times; they were prepared to accept the lowered rates in silence; nothing should induce them to pay higher ones. Confronted with the fact that Parliament had deliberately left to the railway companies a margin between the new maxima and the old actual charges, they replied that the railway representatives had declared that this margin was required only to meet remote contingencies, and had pledged themselves not to increase actual rates under existing circumstances. The Duke of Richmond, the chairman of the Parliamentary Committee which fixed the new maxima, thereupon stated publicly: "That is quite a mistake. There was no such undertaking on the part of the companies." But this authoritative denial produced not the slightest effect on the public sentiment. There was therefore nothing left for our "robber barons" but to surrender at discretion. This they have now done. Some companies have absolutely cancelled all increases of rates. The bulk of them have given an undertaking that no increase shall exceed a five per cent. advance on the old rate. Two companies, the London & North Western and the Great Western, have been too proud to make a formal submission, but even they have promised that they will readjust their rates so that the Board of Trade may have no further ground for dissatisfaction. In all cases the reductions date back to the 1st of January, and any money paid in excess will be refunded. When these concessions were announced, the agitation died down as rapidly as it rose. It remains to be seen whether Parliament, when it reassembles after Easter, will think it necessary to do anything beyond appointing a committee of inquiry.

To an observer, who is neither a trader nor a railway shareholder, the most interesting point in the whole case is the evidence it affords of the frame of mind in which the public approaches the question. It is not that the public believes itself capable of solving the railway problem; the public has not even the remotest notion that there so much as exists a problem to solve. Professor Hunter, a member of Parliament and a railway lawyer of eminence, commences an article in these words: "In dealing with the subject of railway rates we must take care not to be led away by false issues affecting what is called railway economics. The problem which Parliament has to consider is of the simplest possible character," being merely whether the state ought to control railway rates, and, if so, how? And the author of this statement, a gentleman of great ability, has been intimately connected with the railway rates agitation for 12 years past! Or, again, Sir James Whitehead, an ex-Lord Mayor, member of Parliament and president of an important traders' association, ingenuously remarks in a letter to the *Times* that every one "must know that the true basis of a rate is the cost of the service or accommodation in respect of which it is charged." The practical proposals are on a par with the theoretical knowledge on which they are based. The Associated Chambers of Commerce of the United Kingdom have unanimously resolved "that special powers should be conferred on the Board of Trade or a tribunal acting under its authority, to determine in all cases, when applied to, what rate is equitable and reasonable." What is wanted is, we are told, "not a costly court of law, but an informal and prompt inquiry, . . . a cheap and expeditious tribunal." "A judge," says Professor Hunter, "would be thrown away upon such practical questions as the reasonableness of a railway rate. . . . Proper persons appointed by the Board of Trade, after hearing parties and making such inquiries as were deemed reasonable, should have power to say, in case of dispute, what the reasonable charge ought to be." "Test cases," says Sir Albert Rollit, a lawyer, a member of Parliament and president of the Associated Chambers of Commerce, "would, as a rule, alone be heard and would determine others." American readers, with the recollection of the Eau Claire lumber case and the Minneapolis wheat case fresh in their minds, can decide for themselves whether the railway problem is one of the "simplest possible character" and how far it is likely to receive a satisfactory solution at the hands of the present leaders of English commercial opinion.

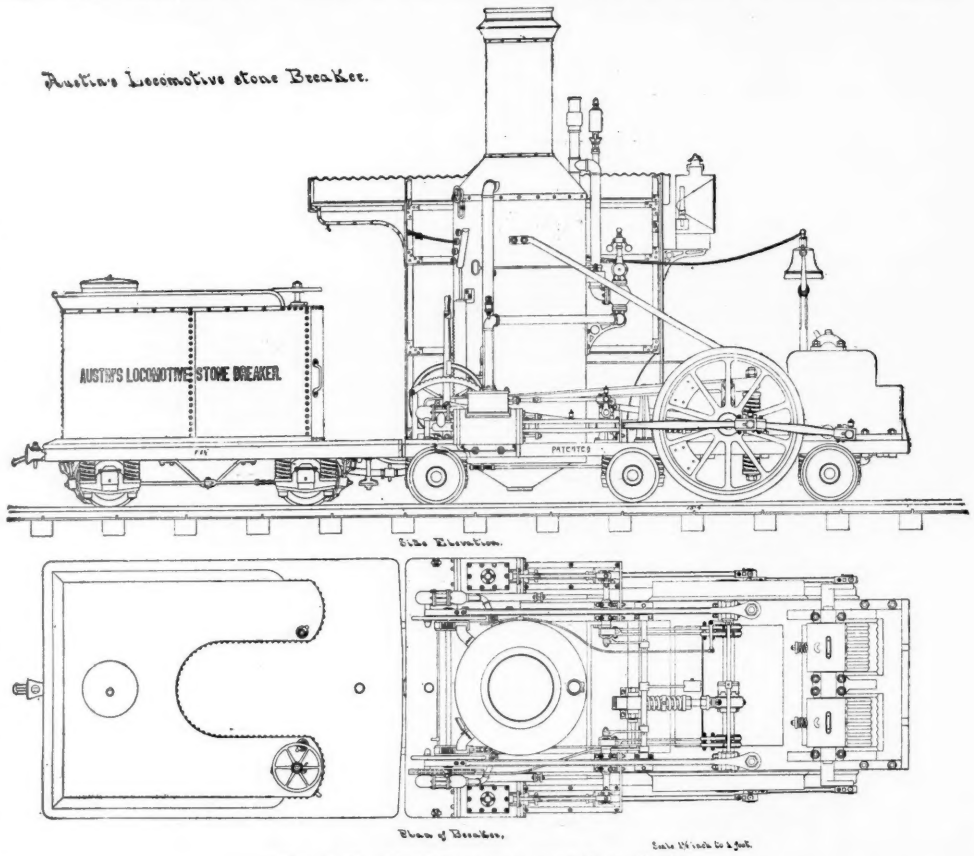


Fig. 1—Combined Locomotive and Rock Crusher.

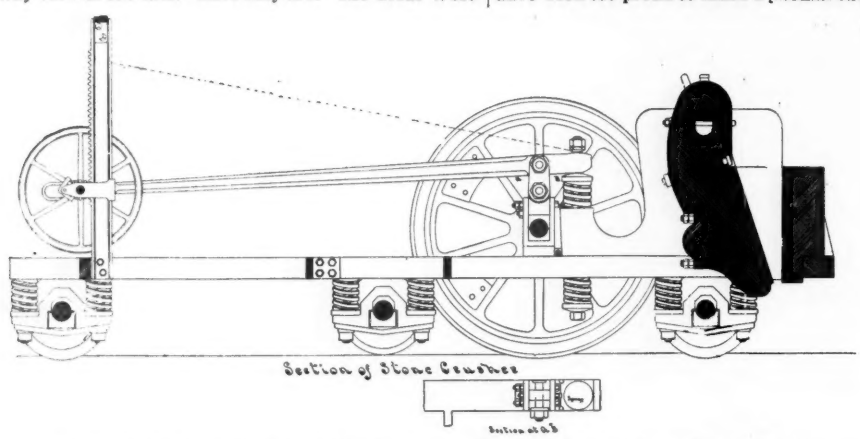


Fig. 2—Austin Stone Crusher—Device for Transferring Weight to and from Driving Wheels.

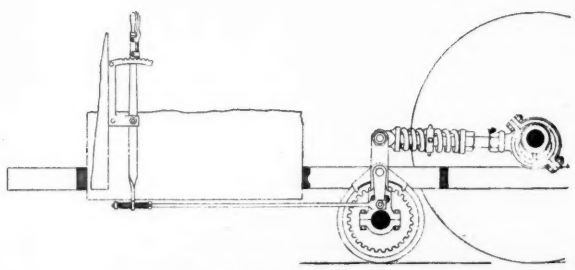
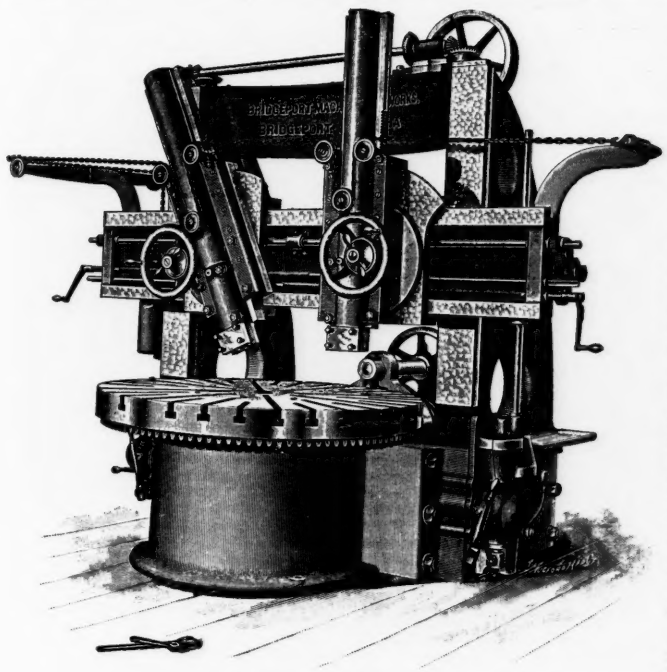


Fig. 3—Stepping Apparatus.

The Austin Locomotive Ballast-Crusher.

Stone ballast for railroads is generally crushed at a stationary crusher located near a quarry or where there is much surface stone. A portable machine for crushing



Bridgeport Boring and Turning Mill.

the stone along the line has been patented by Mr. A. B Austin, of Fort Wayne, Ind., and is shown in the accompanying illustrations. The stone, in large pieces, is distributed along the track, and the crusher, on standard guage wheels, is run to where the ballasting is to be done. There is one pair of driving wheels to the locomotive, and when the crusher is being moved some distance these wheels roll on the rails. When the scene of operations is reached the driving wheels are raised from the track and act as fly-wheels for the crushing machine. When the machine is working there is a stepping device which propels it slowly along the track. The stone from the crusher drops between the rails, and little labor is required to distribute it where required. With the driving wheels bearing on the rails, the engine will travel at good speed.

Fig. 2 shows the arrangement for raising the driving wheels when the engine is to be used as a crusher, and for throwing upon them the necessary weight for adhesion when a journey is to be made; and also a section through the crushing jaws. Fig. 3 shows the device for "stepping" or moving the machine slowly along the track when it is at work.

Bridgeport Boring and Turning Mill.

We illustrate herewith a 62-in. boring and turning mill recently placed on the market by the Bridgeport Machine Tool Works, of Bridgeport, Conn. This concern has made a specialty of tools of this class, and the present machine embodies all the essential features of the smaller mills heretofore built, together with many improvements.

The capacity of the mill is 62 in. in diameter and 42 in. in height. The table is 58 in. in diameter, is powerfully geared and has 16 changes of speed. The teeth on the table, as well as on the pinion, are accurately planed. Either head may be brought to the centre, and it can be set at any angle. The heads carry the tool bars, which have a movement of 30 in. Each head has an independent feed. The feeds are all positive and range from $\frac{3}{64}$ in. to $\frac{3}{4}$ in. horizontally and from $\frac{3}{64}$ in. to $\frac{3}{8}$ in. in angular and vertical directions. The cross-rail is raised and lowered by power. The machine is self-contained, and there is no need of a special foundation. It weighs 20,500 lbs.

Tests of Locomotives in Heavy Express Service

In last week's issue of the *Railroad Gazette* was given part of the discussion at the Western Railway Club of the paper on the above subject by Mr. Forsyth; the following concludes the discussion:

Mr. BARNES: I made this diagram to settle whether there is a large leakage of steam in tandem and other four-cylinder compound engines. Now it does not matter whether it is a Johnstone, Baldwin, Wolf or any other four-cylinder type, for they are all the same in general action.

In offering this method of combining indicator cards I am compelled to take this position for the reason that I can find nothing wrong with it, while I do find much that is incorrect in other methods of combining cards from this type of engine. If there is anything wrong with it I hope to find it out in this discussion. The main point shown by this method of combination is that $Y' K H I$ on the low pressure indicator card is a necessity, and indicates a proper action of a four-cylinder compound, and it would appear that the greater this excrescence is the more theoretically perfect is the action of the engine until the excrescence has reached the theoretical limit shown by the point G.

The combined diagrams show approximately that the loss in a compound locomotive is mostly in the clearances and in the drop in the receivers and valve cavities. The method adopted in Mr. Forsyth's paper for combining the cards is a practical one which gives approximately the results sought for, but is not strictly correct. In combining diagrams from the Baldwin compound, however, the valve clearance should be placed between the two cards, and both should be plotted together at the same point where the low pressure clearance pressure is plotted on the combined diagram in the paper.

The results of some analyses of indicator cards are given in tables 2 and 3 and diagrams 1 to 7.

Diagram No. 1 shows indicator card No. 3 combined on a new plan, as far as I know, which shows the effect of clearance in the cylinders and valves. Diagram No. 2 shows the rate of re-evaporation of steam in expansion in single expansion locomotive engines. Diagrams Nos. 3, 4 and 5 show the decrease in steam weight during compression, and show that measurements for determining the steam in the cylinders during compression must be made at a point as near as possible to the end of the compression period and just before the admission of steam by the lead opening of the valve. These curves are from C., B. & Q. simple engine indicator cards taken during the tests. Diagrams Nos. 6 and 7 show the distribution of steam in Baldwin compound engine 82 used during these tests. The weights of steam given were taken from the indicator diagrams.

Diagram No. 2 was made to show the rate of re-evaporation in locomotive steam cylinders. It will be noticed that as the volume increases the weight of steam increases as the steam expands there is more heat in it than is necessary to keep the steam at the temperature corresponding to the reduced pressure, and also some heat is given back from the cylinder walls, which have been previously heated, and this extra heat goes to evaporate some of the moisture that is contained in the steam. This moisture results from the condensation while the steam is entering the cylinder from the boiler up to cut-off. The Baldwin engine on this test condensed something over 30 per cent. of the entering steam, while the cylinders were being filled from B to E, diagram No. 1. The condensation in some types of engine runs as high as 60 per cent., and other engines under particularly favorable conditions as low as 20 per cent., and perhaps even lower in the first cylinder of the best designed triple expansion engines with steam jackets This loss of heat and the corresponding loss in steam weight is shown on diagrams III., IV. and V., and is interesting mainly in showing that the actual steam line does not correspond with the hyperbola which is frequently drawn to show whether the engine leaks or not. On the combined diagram No. 1, the line ZC'' is the line of zero pressure. The line of atmospheric pressure is just above it. The mean effective pressures and the clearances of the engine are given on the diagram. The indicator cards, shown on the left hand part of the diagram, are an exact reproduction of the ones taken from the engine. The indicator diagram on the right side shows the low pressure diagram enlarged so that the pressure at each individual point of the diagram is plotted on a volume exactly equal to the volume which the steam occupied in the low pressure cylinder when it had a corresponding pressure.

The method of combining the diagrams is as follows:

From O, which is the point of zero volume, the distance $O\,C'$ is laid off equal to the high pressure clearance. $C'\,F'$ is the length of the indicator card as taken. $F'\,P'$ corresponds to the volume of the space in the valve between the high and the low pressure cylinders. $P'\,G'$ corresponds to the clearance in the low pressure cylinder. OC'' corresponds to the volume of the low pressure cylinder, being about 2.93 times the volume of the high pressure cylinder. Between the vertical lines drawn from $C'\,F'$ the actual indicator card is laid out. The line $K\,H$ is the expansion line in the low pressure cylinder taken from the actual indicator card, and the pressure at every point on this expansion line is plotted at a volume point exactly corresponding to the volume of the steam in the cylinders, as shown by the actual indicator cards. At the point H, which is the cut-off in the low-pressure cylinder, the volume is reduced by the amount $H\,J$, which is the sum of the volume of the interior of the valve, or $R\,Q$, and the volume remaining in the high-pressure cylinder and the volume of high-pressure cylinder clearance together, or $V\,U$. Thus, the volume occupied by the steam after cut-off is represented by the distance $O\,M'$, and the pressure corresponding to that volume is $M'\,J$. After cut-off the steam expands from the point J, as shown by the line $J\,I'$, and this line corresponds with the expansion line on the actual indicator card. This method of plotting is necessary in order that a comparison may be made between the lines EE', EE'', DD' and $D\,D''$, which are theoretical lines drawn to show any peculiarities of the expansion of the steam in the two cylinders.

The over-lapping of the low pressure indicator card from H to J is necessary by reason of the abrupt reduction in the volume occupied by the steam at cut-off in the low pressure cylinder. In order that the true area of the combined indicator card may be preserved, it has been found convenient to draw the dotted sections $R\,Q\,P\,S$ and $V\,U\,T\,W$, which are together equivalent to $J\,I\,N\,M$. This makes the mean effective pressure determined from the entire area of the combined indicator cards, including the dotted section, exactly the same as that determined from the orginal cards.

The pressure during exhaust and compression on the combined diagram is plotted at the same point as the corresponding pressure in the steam line of the actual card. The weights of the steam present in the cylinders have been calculated for several points during the expansion of the steam in the two cylinders, and are as follows: At point 1, .57 lb.; at 2, .58 lb.; at 3, .59 lb. Thus is shown the continual re-evaporation and corresponding increase in apparent steam weight during expansion in the high pressure cylinder. At the point 3 the high pressure cylinder exhausts into the valve and into the low pressure cylinder clearance. Here it meets with steam that was retained in the valve at cut-off at the point H or T in the low pressure cylinder and with steam that was left in the low pressure cylinder clearance after compression, and therefore the total steam weight is increased. If no steam leaked out of the valve or condensed from the time it was shut in at cut-off in the low-pressure cylinder, and none of the steam was condensed or lost from the clearance spaces after compression in the low-pressure cylinder, the total steam weight at the point K would be the sum of the steam exhausted from the high-pressure cylinder, the steam that was left in the valve, and the steam remaining in the low-pressure clearance. Table 3 gives these amounts.

TABLE NO. 3.—INDICATOR CARD NO. 3. BALDWIN ENGINE NO. 28. C., B. & Q. TESTS.

Weight of steam at terminal of high pressure cylinder	.5913 lbs.
Pressure of steam at terminal of high pressure cylinder	126 lbs. absolute
Weight of steam in valve at cut-off in low pressure cylinder	.0434 lbs.
Pressure of steam in valve at cut-off in low pressure cylinder	49 lbs. absolute.
Weight of steam in low pressure clearance	.0832 lbs.
Per cent. of total steam in high pressure cylinder at end of stroke remaining in valve	7.3%.
Per cent. of total steam in high pressure cylinder at end of stroke remaining in low pressure clearance	14.1%.
Total increase of weight if no loss in valve or clearance	21.4%.
Actual increase in weight as shown by indicator card	12.%.
Capacity of valve	.475 cu. ft.
Actual weight of steam in valve if pressure was same as at exhaust from high pressure cylinder, as claimed by the builders.	.1205 lbs.

The pressure at K should be 101 lbs. absolute instead of 92 lbs. The weight of the steam in the valve and in the low pressure clearance is about 21½ per cent. of the weight exhausted from the high pressure cylinder, provided there was no loss of any kind from the clearance of the low pressure cylinder and the clearance in the valve after the steam was shut into these cavities. The point G shows what the pressure would be if there was no loss. If all the steam shut in was lost, then the point K would fall about to the point Y. This is worthy of consideration by those who have tried to prove that the rise of pressure at the point K shows leakage in the engines. I believe that the builders claim that the point K should fall at the point Y; but this is a mistake unless they acknowledge that all the steam shut into the valve and into the low pressure clearance is lost. That this steam is not wholly lost is shown by the fact that the point K does actually rise considerably above the point Y.

At the point of cut-off, or at H, we find that the weight of steam in the cylinders, as shown by the indicator card, increases continuously and according to the following numbers:

Weight at K, .66 lbs., and at other points, .66, .68, and at the point H .70 lbs. At this point the volume is decreased by $H\,J$, and steam at the pressure H is shut into the valve and the high pressure cylinder, and the total apparent steam weight is decreased, as shown by the actual indicator card, to .575 lbs., and the pressure, of course, remaining the same as at H. In the case of this particular indicator card the point J falls upon the hyperbola $E\,Y'\,E'$ drawn from the high pressure indicator card expansion line, and indicates that, up to the point of cut-off in the low-pressure cylinder, there has not been leakage enough or re-evaporation enough to raise the steam pressure above the hyperbola. Also in this particular indicator card the expansion line in the low pressure cylinder after cut-off, as shown by $J\,I$, corresponds almost exactly with the hyperbola $E\,E'$, just described. This shows that while at the point of the exhaust from the high pressure cylinder a considerable

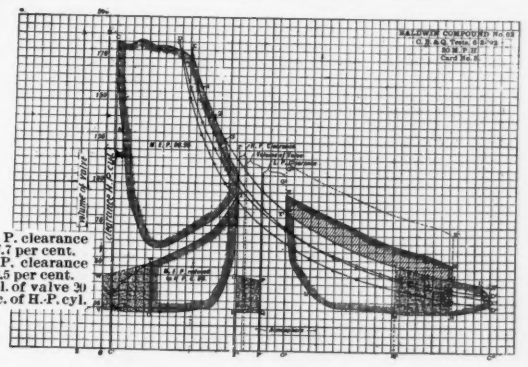


Diagram No. 1.

amount of steam is added to that exhaust, yet this added steam is not wholly lost, but part is returned again to the valve and high pressure cylinder.

If the point J on any combined card should fall much below the hyperbola $E\,E'$, one would suspect considerable loss due to condensation; and if it should rise very much above this hyperbola, one would suspect leakage or an unusual amount of re-evaporation, but more probably leakage. In measuring the area of this combined indicator card, one must follow the lines $H\,K\,I\,E'\,N\,M\,L\,K$.

The proper theoretical line to be drawn for comparison on a combined indicator card is of less importance than the point from which any theoretical line should be drawn. The steam used per stroke in the high pressure cylinder is the difference between the amount present in the cylinder at the point 3, diagram I, and the amount retained in the cylinder during compression, taken for example at the point 4, and is represented by the volume $B\,D$, $B\,E$ being the amount admitted to the high pressure cylinder; so that the theoretical steam line should be drawn from the point D, and not from the point E.

This is so because in any compound engine the amount of water in the shape of steam or moisture taken from the boiler at each stroke of the high pressure cylinder must be the same as that thrown out from the low-pressure cylinder at each stroke. If the volume $B\,D$ and pressure at D indicates the amount of steam given from the high pressure cylinder to the low pressure at each stroke, then this amount should be looked for after the cut-off in the low pressure cylinder, barring, of course, all gains and losses.

This leads to the conclusion that in an examination of the steam lines on the combined card from E to H the

TABLE NO. 2.

Engine.	Indicator card.	Speed, in revolutions per minute.	Weight of steam used per stroke, H. P. cyl.	Weight of steam used per stroke, L. P. cyl.	Increase of weight of steam in L. P. cyl.	Decrease of weight of steam in L. P. cyl.	Per cent. of increase weight of steam in L. P. cyl.	Per cent. of decrease weight of steam, L. P. cyl.	Cut-off in H. P. cyl., per cent., approximate.
Baldwin No. 82 in C., B. & Q. tests.	51	121.4	.4999	.5026	.0027		0.5		67
	48	140.1	.5000	.4931		.0069		1.4	63
	8	210.2	.3428	.3650	.0222		6.5		58
	3	140.1	.5071	.4908		.0163		3.2	64
	33	186.8	.3780	.4052	.0272		7.2		58
Baldwin No. 82 in Erie tests.	1	120	.4568	.4451		.0117		2.5	58
	2	160	.4320	.4452	.0132		3.0		57
	3	160	.4293	.4007		.0286		6.6	56
	4	140	.3499	.3564	.0065		1.9		48
	5	172	.3605	.3681	.0076		2.1		52
Schenectady, 12-wheeler, Eng. No. 367.	2 & 2a	150	.8622	.7103		.0919		11.46	44
	6 & 6a	156	1.1374	1.0646		.0928		8 02	66
	7 & 7a	180	1.3347	.9994		.0453		4 38	55
	8 & 8a	192	.9518	.8579		.0939		9.86	51
Schenectady, 10-wheeler, Mich. Cent.	61	100	.7920	.7144		.0776		9.8	59
	74	152	.7028	.6363		.0665		9.46	59
	80	124	.8247	.7259		.0988		11.08	59
C., B. & Q. Mogul Eng. No. 324.	8	243.9	.5861	.6631	.0770		13.1		41
	49	173.4	.4932	.6001	.1669		21.6		35
Rhode Island comp. on Brooklyn Elevated.	27	180	.2765	.2639		.0126		4.0	86
	12	306	.1576	.1421		.0155		9.0	64
Great Eastern Worsdell Comp. Eng. No. 230.	3	252	.5110	4586		.0524		10.	42
	4	192	.4992	.4609		.0383		7.7	57
	5	264	.3918	.3390		.0528		13.5	48
Mexican Central, Johnstone Comp.	1	72	.5930	.6918	.0988		16.6		69
	2	60	.5947	.6611	.0664		11.2		70
	3	57	.6344	.7140	.0796		12.5		79
	4	66	.5887	6399	.0512		8.7		70

theoretical expansion line should be drawn from the point *E*, and for the examination of the steam pressures after cut-off in the low pressure cylinder the theoretical steam line should be drawn from the point *D*. Then, to determine the leakage, re-evaporation or condensation, during the passage of the steam through the cylinders, the theoretical steam line should be drawn from the point *D* and the comparisons should be made after cut-off in the low pressure cylinders.

In this particular diagram both the hyperbola and the adiabatic lines have been drawn from both points *E* and *D*. *E E'* and *D D'* are hyperbolas. *E E''* and *D D''* are adiabatic curves. The point *J* rises considerably above the adiabatic curve drawn from *D*, and shows either some leakage or re-evaporation. It also falls somewhat above the hyperbola from the point *D*. This is a further indication of leakage or re-evaporation; but as shown from diagram No. 2 there is and should be in every ordinary engine a considerable amount of re-evaporation, which will frequently raise the actual steam line above the hyperbola. I do not think the combined diagram is the best way to show leakage. It is not as accurate as the comparison of steam weights.

Take this particular card and refer to table 2. It will be seen that the card shows that .507 lbs. of steam was used per stroke in the high pressure cylinder and .493 lbs. used per stroke in the low pressure cylinder.

As far as the indicator card goes there is no evidence of more steam being thrown out of the low pressure cylinder than is thrown out of the high pressure cylinder, which would be the case if there was any marked leakage through the piston valve. This is also true of other cards from this and other engines of the same type, as shown by table 2. Some of the cards show a decided increase of steam in the low pressure cylinder, but this I believe to result from the use of steam direct from the boiler in the low pressure cylinder.

The action of the steam in a four-cylinder Baldwin compound is perhaps quite as well shown by diagrams 6 and 7. The points 1, 2 and 3 are during the expansion in the high pressure cylinder. The rate of re-evaporation (and it probably is re-evaporation) is shown by the dotted line, which bears about the same angle to the horizontal line as the re-evaporation lines on diagram 2. If on diagrams 6 and 7 this dotted line be continued until the point 4 is reached, which is the commencement of the stroke of the low pressure cylinder, the same rate of re-evaporation continued would increase the apparent weight of steam to the actual amount shown by the indicator card. This follows from the fact that the continuation of the evaporation lines 1, 2, 3 in diagrams 6 and 7 pass nearly through the point 4. But it is not to be expected that this rate of re-evaporation continues up to the point 4, but more probably follows the line 3-5, diagram 6.

Assuming that the rate of re-evaporation continues according to the line 1, 2, 3, 5, and plotting the distance 5—9 equal to the calculated weight of steam shut into the valve and low pressure clearance, the distance 4—9 represents the loss in the weight of the shut-in steam, and on diagram 6 and card No. 3 it corresponds to the reduction in pressure from *G* to *K* on the combined indicator diagram 1. If the clearance space in the valve has been filled with steam at the same pressure as at exhaust from the high pressure cylinder, as claimed by the builders of the engine, then the pressure ought to have been at about *G''*, diagram 1, and the loss would have been *G'' K*. To claim that the valve is filled to the same pressure as the pressure of the exhaust from the high pressure cylinder is to claim that the area represented by *G' K H H'* is wholly lost. But this is not the case.

In table No. 2 the columns of particular interest are those which show the per cent. of increase or decrease of the steam used in the low pressure cylinder. From the results of the analysis of the cards from the C., B. & Q. compound it will be noticed that the crack in the cylinder saddle caused so much leakage as to show a considerable increase of steam used in the low pressure cylinder. In closing upon this very important point of the relative amounts of steam shown in the high and low pressure cylinders, it is necessary to add that a 10 per cent. difference in the steam used by the two cylinders is not necessarily followed by a 10 per cent. loss in the engine, and it may be that no material loss follows as much difference as this, for much depends upon the grade of expansion and conditions. Cards Nos. 33 and 8 from engine No. 82 probably show the effect of having the starting valve open and steam going through to the low pressure cylinder direct from the boiler.

In reply to some questions by Mr. Barr, Mr. Barnes explained that the re evaporation was determined by measuring the volume of the steam and the pressure of it, and that in some classes of engines there might be condensation. The combined diagram shows that there is really more re-evaporation than cylinder condensation in the low-pressure cylinder, but it was impossible to distinguish between a leakage and re-evaporation. The analysis of a large number of cards indicated that there is more steam, by weight, used in the low pressure cylinder than in the high, and that it comes from the re-evaporation of the steam that is condensed when steam enters the cylinders.

Mr. BARR: Our road has a compound locomotive and when in charge of our best engineers for the first year generally headed the list on the performance sheet, but after that when in charge of the worst engineers was at the bottom of the list. He thought that part of the change might be due to the engine needing repairs, but if the compound got out of order so much quicker than the simple locomotive the fact should be known. I am on the fence yet, but we are getting a few more compounds and before many months will know more about them.

Mr. BARNES: I am not prepared to say that the compound locomotive is more economical in fast passenger service. It will give a better blast on the fires, be easier on the fireboxes, and in some cases pull more at high speed than a simple engine. I think those are the main advantages.

President LEWIS: It seems to be a case of the parent seeing nothing wrong in an only child, while those not interested in it or the parents think it a little bore.

Mr. BARNES: I am not the parent of the child, but am in the position of having 45 of the Baldwin compound engines in service. I can easily show that they are more economical than a simple engine would be, though probably not more so than a two-cylinder compound. They have 4-in. nozzles, and the exhaust is so light that the muffler is not needed to lessen the noise. In suburban service the locomotive is starting most of the time, and under such conditions the single expansion engine expands the steam but little, whereas the compounds always expand it at least three times. Any reasonably good compound engine will be more economical than a simple engine in rapid transit work. The compound locomotive will show no saving over a simple engine unless the latter wastes steam, and steam is wasted when it is not expanded at least four times and the back pressure reduced as much as possible.

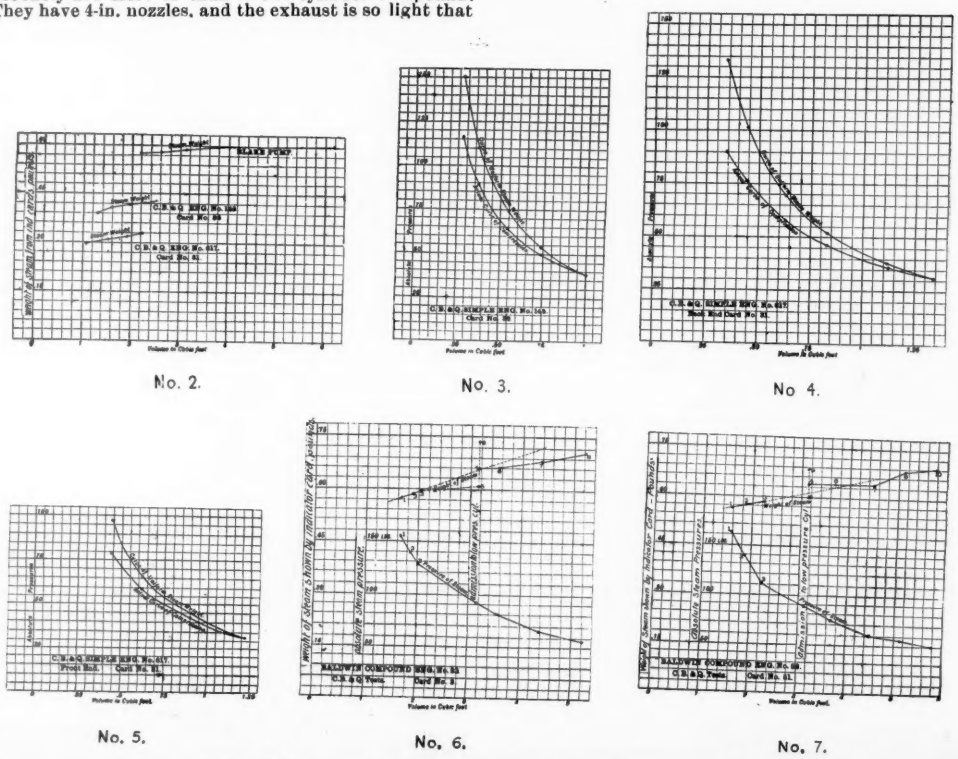
Mr. BARR: Mr. Barnes, in making these statements, is more radical than the view that I have taken. My impression was this: that in the compound engine the cylinder condensation, in some way never shown to my satisfaction, is reduced and economy results. If it is so, then there ought to be some economy in the compound engine over the simple engine, even if both were used in the best manner. The simple engines on the road are working uneconomically, so far as actual fuel provision is concerned, but not uneconomically so far as the whole railway is concerned. When we put our compound against the simple engine, they were both to be run at 180 pounds pressure. The compound would not do the work of the simple engines, so the pressure was increased to 200 pounds. Now if we would arrange our engines so that when the reverse lever was forward it would not admit steam to more than half the cylinder we would have nearly the same conditions that we have in the compound. We would certainly save fuel, bnt there would be trouble on the road. There is the advantage in compounding that you can use the compound as a simple engine, but you use it very uneconomically when you do.

Mr. QUEREAU: These tests are of locomotives in fast passenger service, and a good deal of the discussion to-day has been as to their action in freight service. The economy of compound locomotives, when compared with simple, is due largely to three things: A greater expansion of the steam used, less cylinder condensation, and a better exhaust. In fast passenger service the compound engine loses the greater part of all three of these advantages. An examination of the indicator cards of the simple engines given in this report will show that the compound locomotives did not expand steam any further or more economically than the simple engines. I mean simple expansion in itself. This being true, the compound engine in fast passenger service could not hope to have much advantage over the simple engine in expansion, so far as condensation is concerned. I have supposed that the higher the speed the less the condensation; then in fast passenger service there would be less chance for the compound to show a saving.

So much has been said about compound, in comparisons with simple locomotives, that some of the report has been overlooked—information, it seems to me, which is equally valuable. For instance, the comparison of the Class H and the Class M simple engines Class M engine No 617 had to work at longer cut-off than the Class H engine. The Class H engine had an Allen port in the valve, which would help account for the high steam line on the card, and 5-in. valve travel. The Class M had 6-in. travel and a plain valve. The Class M engine had an 18-in. cylinder, while H had 19. A comparison of the record of Class H engine No. 145, Aug. 18, with 12 cars, remembering that the Class H engine has a larger grate area and greater weight on the drivers, with the trip of No. 617, with 11 cars, and a comparison of the water rate and the coal rate for the two trips, shows that the Class H engine uses coal per horse power per hour, 6.70; the class M engine, 5.73, showing a saving for the lighter engine, with smaller heating surface; the Class H engine 34.3 pounds of water per horse power hour; the Class M engine, 31.6; also an economy in the amount of water used. Here is simple engine against simple engine. It seems to me that this economy in water is due to the 6-in. valve travel of the smaller engine.

Mr. Quereau also explained how, by weighing the cinders in the smokebox at the end of a run and estimating the amount thrown out of the stack, the conclusion was arrived at that the four-cylinder compound, with a 5¾-in. nozzle, was harder on the fire than the other engines with 5-in. nozzles.

Mr. HERR: Did the same engineer run No. 145 that ran No. 617 in these two tests? I would also point out quite a difference in the temperature of the feed water in the runs having the same number of cars—those dated for



No. 2. No. 3. No 4.

No. 5. No. 6. No. 7.

Tests of Compound and Simple Locomotives—Diagrams 2 to 7.

No. 150, Aug. 2 and 3, and the compound, June 6 and 7. The average temperature for the compound was 60½ for the feed water, and for the simple engine 74. That should make a difference in favor of the compound in the neighborhood of 1 per cent.

Mr. FORSYTH: The simple engines were all run by the same engineer. The difference in temperature of feed water is equated in the showing of evaporation from and at 212, but not in the actual performance of the engines.

Mr. RHODES: There is one feature about these reports which I think the members of the Club may like to know about, and that is, what action the C., B. & Q. has taken resulting from these tests.

It must be borne in mind that we do not build locomotives to produce maximum results from a particular feature. The locomotive is there to do general railroading, and we often have to sacrifice some parts in order that it may do general railroad business successfully When we got the Wootten engines we found that they would burn the slack coal which we have had in Iowa, which was used to spread on the track and which has latterly been used in a stationary boiler where we have good draft. When they got lump coal they always failed in steam. A second objection was the construction; with the bad water we found it was utterly impossible to keep them up. We would only get about three years out of the fireboxes. So for general railroad purposes the Wootten engines were not a success on the C., B. & Q. From the Wootten engines we got ideas of burning our low grade fuel and the result was the designing of our class H engine, with its type of firebox and large grate surface.

The Mogul type was decided upon to handle the heavy double header passenger and fast freight trains, so as to reduce the number of parts liable to cause delay from accident on the two locomotives then necessary. But these tests bring up another feature. We find that at these very high speeds the pull on the drawbar as recorded by the dynamometer car is very much less than at low speeds, showing that the adhesion of an engine necessary at high speeds is much less than at low speeds, and that if we are making long continuous runs it is not necessary to have such immense adhesion to the track.

With the class M engine all connections are reduced one-third. We have an engine which costs less to build and which costs less to maintain. As a result of these tests, then, we are, at the present time, figuring on equipping our through heavy fast passenger trains with this Class M type of simple engine. For certain of our passenger trains with many stops we shall still use our Moguls. I have thought that in Europe they are not so slow in having certain engines for fast express trains with only one pair of drivers. If the pull on the drawbar at high speeds is so light that great adhesion is not necessary there is some pretty good argument for reducing the number of parts. We have 30 of the Class *M* engine now under way.

Mr. BARR: Mr. Rhodes' expression of ideas coincide exactly with what I have been entertaining for the last year and a half in the matter of fast passenger engines.

President LEWIS: The results of this discussion would seem to indicate that the compound engine has proved to be the most economical engine for some special service, and that for general service it does not meet the expectations of mechanics. I think that it is true, from all of the data that we have been able to receive in connection with the tests of compounds. For elevated suburban service it is quite likely that it is more economical than the simple engine would be.

After recess the discussion of the Rules of Interchange was begun.

The Heilmann Electric Locomotive.

Reference to the electric railroad system devised by Mr. J. J. Heilmann has already been made in the *Railroad Gazette* on several occasions. Mr. Heilmann, as may be remembered, has proposed as an intermediate solution of the propelling power problem on railroads, one which will admit of utilizing electric traction without necessitating any change whatever in the ordinary roadbed and track system. This he designed to accomplish by fitting up each car of a train with electric motors and by supplying the necessary current from a special car at the head of the train, this car also being self-propelling electrically and carrying a steam boiler, engine and electric generator outfit. Subsequently Mr. Heilmann designed such a car as an electric locomotive pure and simple, to develop about 500 H. P. in motors fitted on its axles, supplied with current from the generators carried on the car itself, and intended to haul trains after the manner of an ordinary steam locomotive. An illustration of one of these electric locomotives, now being built at the works of the Société des Forges et Chantiers de la Méditerrané, at Havre, France, is reproduced herewith from the *Revue Industrielle*, and shows the more prominent features of the whole arrangement.

Steam is furnished by a boiler of the Lentz type, with corrugated furnace and combustion chamber, coal bunkers and water tanks being arranged at both sides of the boiler. The latter is placed at the rear of the locomotive, the chimney also being at the rear, with the furnace doors toward the front end.

Directly in front of the boiler, with due allowance for firing room, is a horizontal, nominally 500-H. P. steam engine, placed transversely. It was designed by Mr. C. E. L. Brown, and is compound, the high and low pressure cylinders being placed opposite each other, with pistons working 180 deg. apart. Special attention has been given to the balancing of all the moving parts of this engine. The valves, which are of the circular type, are placed underneath the cylinders.

The engine is coupled directly to the generator shaft, the generator being a continuous-current dynamo furnished with a separate exciter. The latter is worked by a small verticle steam engine as shown in the cut. The generator will furnish a current of 1,025 ampères and 403 volts, and is a six-pole machine. The exciter is of the four-pole type, rated at 20 H. P., and besides furnishing the exciting current is to serve also the purpose of lighting the train. The electric motors mounted on the driving axles also are of the four-pole type.

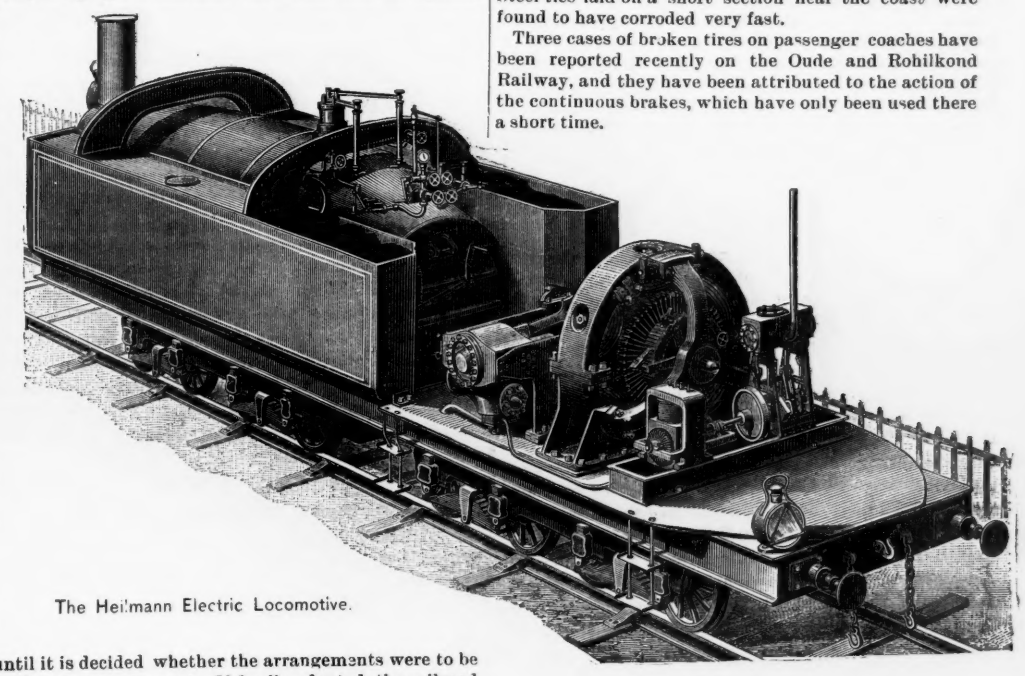
The weight of the whole locomotive, completely equipped, is placed at about 100 tons. When completed the engine is to be subjected to prolonged and careful trials on the French state railroads.

Indian Railroad Notes.

The weather has been unusually cold and rainy, and the thermometer has registered 10 degrees lower than usual. In the Himalayan stations there have been as much as 8 ft. of snow. The heavy rain and hail have done a good deal of damage to crops, and it is feared that the wheat crop will be considerably below the average. The cold weather has not interfered with the railroads, although it has happened for the first time in the history of Indian railroads that a train has been snowed up on the frontier section of the Northwestern Railroad, and there locomotives have been equipped with flangers.

The coal traffic still increases, and new fields are about to be opened up in the best coal-producing country in India.

A large supply of fittings for the automatic vacuum brake have been received and are being applied on the East India Railroad's rolling stock as fast as possible. Fittings and apparatus for Pintsch gas have also been received, and travelers will shortly have the comfort of a good light at night. Pintsch gas has already been used some time on the Bombay railroads, and the Pintsch company has offered to erect plants and supply gas, charging the railroads the actual cost of lighting



The Heilmann Electric Locomotive.

until it is decided whether the arrangements were to be made permanent or not. If finally adopted, the railroad company will take over and pay for the plant.

On the East India a new rail section has been adopted weighing 85 lbs. per yard instead of 75 as now used. The double-headed rail is fast going out of favor in India, and either the bull-headed or the flanged rail will be mostly used in the future.

The companies continue to order large quantities of metal ties from Europe, although it would seem to be perfectly practicable, and certainly economical, to make cast iron ties of the old bowl shape in India.

In February another serious landslide occurred on the Quetta line, and the trouble in this way has been so serious that a committee of distinguished experts has been appointed to visit the spot and devise a remedy. This slip is said to extend back more than a mile from the line of railroad. Of course this is a line where we cannot stand interruption by landslides or anything else, as nobody knows when it will be terribly needed for military purposes. The Amir of Afghanistan is as active and as sly as ever, and is making as good Martini-Henry rifles at his own small arms factory at Kabul as can be imported from Europe.

The Mushkaf-Bolan Railway is being pushed and has had a heavy allotment of money for the years 1893 and 1894. Between Mach and Kalpour a double track is laid, as the grades are steep, and it is considered necessary to avoid all chances of a blockade or other trouble, considering the delicate situation. A short time ago Pathans tried to wreck a tunnel on the Scind-Pishin section of the Frontier line by placing packages of dynamite on the rails. It was at first thought that this dynamite had been stolen from the stock of the railroad, but it was found that the packages were entirely different from those kept in stock, and must have been brought from a long distance.

The Director General of Railways has decided that except under special circumstances barbed wire fences are not to be used on Indian railroads. The reasons assigned are that the wire is easily broken by large animals or for mischievous purposes; that there is difficulty in tightening it owing to the barbs, and that, as the wires can be easily tied together, trespassers find no difficulty in getting through the fences.

The government has decided to stop boring for oil in Beluchistan after spending over six lacs of rupees on the experiment. At one time it was thought that the supply of oil would be so great that it would pay to alter the locomotives for oil fuel. So far native mineral oil has not been able to compete on equal terms with imported oil, and now that Russian oil is being imported in bulk it bids fair to put an end to the production of oil at home. The new railroad tanks at Budge-Budge depot, 12½ miles below Calcutta, have been completed and some of the importers are having tank cars built to carry it up the country without being canned. Hitherto, the well-known tins which came from America with Snowflake and Devoe's oil have been used extensively for carrying oil, ghee and molasses by rail, and what the native dealers will substitute for these clean and handy tins, now that oil is coming out in tanks and all the tins available will be required for refilling, is a question.*

The Engineer-in-Chief of the East Coast Railway recommended the purchase of a few powerful locomotives for the heavy grades, but the government in sending forward the requisition reduced the capacity of the tanks from 3,400 to 3,000 gallons, an alteration which will make little difference in the cost, but a good deal of difference in the efficiency of the engines where water is scarce. The Consulting Engineer has recommended that for this road wooden ties shall be used on all sections within a certain radius of the coast, and orders have been given for creosoted pine ties to be used where salt water or dampness is likely to injure the steel ties. Steel ties laid on a short section near the coast were found to have corroded very fast.

Three cases of broken tires on passenger coaches have been reported recently on the Oude and Rohilkond Railway, and they have been attributed to the action of the continuous brakes, which have only been used there a short time.

The trouble about silver exchange is really very serious. Employés who have served 15 or 20 years are worse off now than they were 10 years ago, and the highest paid officials have scarcely anything left for their own expenses after paying the bills for the education and support of their children in Europe.

Several new cotton and jute mills have lately been built, on the banks of the Hooglay, although many of the older concerns are not doing very well and the outlook is not particularly promising. NUTLOCK.

CALCUTTA, March 14, 1893.

As bearing upon what our correspondent says of the Beluchistan oil we reprint the following from the *Indian Engineer*:

Some misconception seems to have arisen regarding the action of the Government of India in the matter of the Beluchistan oil fields. The bare statement that they have stopped all operations which had for their object the production of petroleum in large quantities does not accurately represent the position; while the insinuation that many lakhs of rupees have been wasted to no purpose is distinctly malicious. If efforts had not been made to test the capabilities of the oil-bearing strata at Khattan and elsewhere where petroleum "showed" on the surface rocks, the charge would have been made that the government were losing an opportunity of developing a new industry. A good deal of money has not unnaturally been spent on the operations, experts having been employed for seven or eight years in endeavoring to tap the natural oil reservoirs which are still believed to exist deep below the rocks. . . . The government decided to ask Dr. King, Director of the Geological Survey, to report upon the desirability of continuing the borings. Dr. King gave his opinion that the results of the practical experiments, coupled with the knowledge gained of local geological conditions, barred all hope of striking a useful supply of oil in the districts within convenient distance of the railways. He, therefore, advised that all oil exploitation in the Agency should be left in abeyance until the rest of the country was more fully developed and surveyed. The experimental boring at the Chappar Rift was accordingly stopped, and nothing further will be done until the geologists have reported upon areas which seem likely to contain mineral oil.

* The reader will probably remember that in our issue of April 7 we mentioned the fact that petroleum is now being carried to India by tank steamers through the Suez Canal, and that the efforts to compel the Canal company to forbid the passage of these steamers have failed.—EDITOR.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The World's Fair is opened and on another page we have given a brief statement of its present condition and of the experience of the local transportation companies in handling the immense traffic of the opening day; for in spite of two weeks of storms and the consequent discomforts and disappointments and in spite of a threatening morning, the attendance on the first day was unprecedented. The best estimates make it over 300,000. The maximum attendance at the Paris exhibition of 1889 was 402,000 on one day in October when rates were reduced, and the average was 130,000 a day. It is possible that the attendance on Monday at the Columbian Fair will be exceeded on some other day, but it probably gives us an approximation to the maximum attendance that will give a fair measure of the demands to be made on the means of local transportation. Certainly these means are inadequate if adequacy consists in the prompt movement of traffic and the avoidance of disagreeable and even dangerous crowds; but they can handle the passengers after a fashion now, and will be enlarged and improved a good deal in a very short time. With the Illinois Central and the Chicago & Southside Rapid Transit (elevated) it is a question of improving details. The steamer service has not really begun, but it ought to accommodate a great many people if it is ever organized and equipped on the plan laid out; and the lines entering the World's Fair terminal station may hope to build up some business, although their routes are very roundabout and their time slow and uncertain because of the numerous grade crossings. The chief use of these lines will be to keep people out of the city by giving a frequent service between the suburbs and the Fair.

One will hardly be likely to over-estimate the importance of the successful opening of the World's Fair. It is undoubtedly the greatest exhibition ever attempted, in the magnitude of preparation, volume and variety of exhibits and probable attendance. Foreign commissioners now on the ground, who have seen all the great world's fairs of recent years, agree in this. The degree of its success will have a considerable effect on the prosperity of the country for the next year; and it will doubtless be a powerful stimulus to the industry, science and art of the whole land for a long time to come. For the transportation interests it has an especial significance. The display of the machinery of transportation and of closely allied industries is of great educational use to the persons directly interested and has a good deal of advertising value with the general public, while the great passenger movement now set a-going ought to swell the net earnings of the transportation line.

The plans which the directors and the receivers of the Philadelphia & Reading have under consideration for the relief of the company from its pressing obligations have been the subject of much discussion the past week, and some change in the arrangements has been announced nearly every day. It was at first supposed that the receivership would last a year or more, but the money borrowed in such large sums on such important and varied collateral demanded immediate care if anything of the collateral was to be saved. Hence it is announced that a plan of reorganization will be promulgated without delay. So far as given out the proposition is to issue six per cent. bonds, which it is hoped to sell at about 95, and to issue enough to cover three main features, the floating debt, probably eighteen or twenty millions, the funding of five years' coupons on the general first mortgage and to provide for a large number of new cars and engines, and other improvements. Interest on the present preference bonds is payable only if earned, but the principal comes next to the first mortgage. It was supposed that the new bonds could be put ahead of the income bonds, but as this could be done only by consent, and as foreign holders would be certain to resist, the idea was abandoned for a new issue of bonds under a form of collateral trust mortgage covering principally the very collateral now hypothecated under the McLeod loans now pressing. Supposing the new bonds issued and sold—and this is jumping over great difficulties—the increase in fixed charges will be $1,800,000 annually. It is really impossible to say what the actual fixed charges have been n years past, or what the real earning power of the property, after allowing for proper renewals of equipment and roadbed, and also "deadwork" and other proper expenses in working the mines. This $1,800,000 is not wholly a new burden by any means, but whatever the actual increase, we are within bounds in saying that the company can carry its great load and earn its charges in the future only on the condition of uniformly favoring skies. A fair degree of harmony among the great coal companies seems absolutely essential. The anthracite collieries now opened can send to market more coal than can be sold; hence if a fair price is to be obtained and any profit made possible, there must be restriction in the mining, and an understanding as to wholesale prices and freight rates among the carrriers. In short, Mr. McLeod during his short and disastrous management has set the forms for the anthracite trade of the future, and these forms must to a certain extent be adhered to apparently. The millions spent to secure them are gone and must now be arranged for.

The effort of the legislature of the state of Illinois to prevent ticket scalping has met a serious check, and it appears that the law is futile, if not unconstitutional. On Wednesday of last week a decision was rendered in the Circuit Court sitting at Chicago by Judges Tuthill, McConnell and Dunne, in the case brought against several ticket brokers last October. Six brokers were indicted under the Illinois law, and the Court discharged them. The opinion says the law is a very peculiar one. It provides that it shall be the duty of any steamboat or railroad company to provide its agents with certificates setting forth their authority to sell tickets. The Court reads the act as providing that any duly authorized agent of any railroad or steamboat company may sell not only the tickets of that company, but those of any other railroad or steamboat company. The indictments are based on the theory that the law is violated if a person shall sell the ticket of a railroad company if not authorized by that particular company to do so. The law is plainly otherwise. The agent may not be authorized by the Wabash to sell its tickets, but he may sell tickets over the Wabash line if authorized by the Rock Island road. The indictments averred that the defendant sold a ticket over a particular line not being authorized by the corporation owning the line; but it does not follow that each of the defendants may not have been authorized by the owner of some other railroad to do so, and this consideration makes the indictments bad. No violation of the law is shown. Taking this view of the case, the Court considered it unnecessary to pass on the constitutionality of the law. The peculiar provision, which is condensed above, differs from the statutes of Pennsylvania or Indiana. It is "a remarkable and unusual delegation of the sovereign power of the state," and the Court intimates that it is unconstitutional. Furthermore, the act bears evidence of hasty preparation and slight legislative reflection. It is made the duty of the owners of any railroad or steamboat company to provide each agent with a certificate setting forth his authority to sell tickets, duly attested by the corporate seal of the owner. It seems to follow that if the transportation company is not incorporated it cannot appoint agents; hence, that it will be unlawful for the agent of a private owner to sell tickets, and the Court asks, "If the statute is susceptible of this construction, can it be held to be valid?" The result of this suit appears to be to throw open the field in Illinois for the free operation of the scalpers, and it cannot be doubted that they will make a magnificent harvest this summer and that they will complicate the question of maintaining rates all they can. It is a great misfortune, therefore, that the Illinois law was not more carefully drawn, for the intention of the legislature was doubtless good.

The Chicago Discussion on Compound Locomotives.

In another column the discussion of Mr. William Forsyth's paper on tests of compound locomotives before the Western Railway Club at the April meeting is continued from last week's issue. The paper brought out some very good points, and so far as we can see Mr. Forsyth has been able to substantiate nearly, if not quite, all the statements made about the engines tested. It must be remembered that any individual set of tests is to be taken only as one set, and that general conclusions can be drawn only from many sets, and safe conclusions are possible only from such sets of experiments as give results which confirm one another. Mr. Forsyth and his testing department have a reputation for accuracy, and no one can doubt that all that is recorded in Mr. Forsyth's paper is correctly recorded and exactly agrees with what took place at the tests; and although it may appear that the results of the tests are unusual and even, perhaps, unwarranted from a knowledge of the designs of the engines, yet the fact remains that the figures given are true to the actual results; and if there was anything not in accordance with what would naturally be expected from the engines tested, it must be looked for in the engines, and not ascribed to defects of observation.

Just now we are confronted with some remarkable results from two distinct types of compound locomotives, and it will require considerable argument and perhaps no little investigation to make these results harmonize. The difference in these results is too great to be allowed to pass unnoticed. The reason for the difference is not clear, and there is nothing so far in the published data that gives us any clue. We have examined a number of indicator cards from two types of compound engines and find the water per horse power as shown by the indicator card to be more than is claimed by the builders for the entire water used.

One important fact which bears on this point is the results obtained at some recent tests at Milwaukee of one of the latest compound pumping engines built by E. P. Allis & Company. It is a triple expansion engine with a condenser. The water used per horse power per hour, from very careful tests made by an expert engineer, was found to be 11.9 pounds.; therefore, we may safely take the indicator cards from this triple expansion engine as being about the best that can be produced under the most favorable circumstances. We have examined these indicator cards, and have combined them, and find that the combined area of the actual cards almost equals the area of the theoretical card. There is practically no compression and no wire drawing The cards are full and perfect. The cards from the high pressure cylinder and from the low pressure cylinder taken together practically represent the best that can be obtained with any two-cylinder non-condensing compound. Bearing this perfection in mind, the water required per horse power per hour for the whole engine, divided by the power produced in the high and low pressure cylinders, only gives a little less than 18 pounds of water per horse power per hour. The water rate claimed for two types of compounds in railroad work is about that of the very highest grade of non-condensing stationary engines working under the most favorable conditions. We do no attempt to say why this is, nor to explain it, as we are unable to do so without having complete data to work from. If there is, in fact, any such difference between the compound locomotives now in use, as is shown by the results so far given, it is a most important matter and one worthy of immediate investigation. Our own conviction is that this difference does not exist and that there is something wrong in the premises: but just where it is wrong, we have been unable to determine.

Referring again to Mr. Forsyth's paper and the discussion upon it, careful readers will notice that the discussion has now assumed a thermo-dynamic attitude, and those who care to follow the arguments will have to brush up a little in the theory of steam engines. The cause for this tendency in the present discussion arises from the claims made by different locomotive builders about the perfection of steam use in

their engines. Some of the claims have been so radical and so sweeping that nothing but a thermo-dynamic analysis can refute them as completely as they should be refuted. As a rule, we believe in adhering closely to good practical results as a basis for changing locomotive design; but as long as locomotive builders and experimenters cling to generalities and avoid accurate, complete and exhaustive practical tests, with proper measuring instruments, to determine the savings and the exact features of construction and operation which give those savings, all that one can do is to keep well informed about the limits of possible savings and losses in order not to be misled by exorbitant and unfounded claims, which are too frequently heard for and against different types of engines, more particularly compounds. Thermo-dynamic analysis is the only safeguard under these conditions, as by such analysis one can tell, not exactly what can be done, but what cannot be done. In this connection it may be interesting to note that some claims have been made, both in regard to losses due to compounding and to savings by compounding, that are readily shown by thermo-dynamic precepts to be impossible. It is not much help to the locomotive designer to note that a given compound saves fuel when compared to a single expansion engine. What he wants to know is just where that saving is obtained. If it is in the firebox he will proceed in quite a different way for future work than if it is in the cylinders or the higher boiler pressure.

Prof. W. F. M. Goss has been doing some very excellent work at the Purdue University with his locomotive mounted in the mechanical laboratory. The pertinent fact about his work is the possibility of a duplication of results day after day, and we shall know more about the real comparative value of different compound locomotives, and probably know wherein the difference lies between such locomotives when the work of Professor Goss is extended to include a variety of locomotives.

The present aspect of the discussion about compound locomotives should have some bearing on the work of the committee on standard tests of locomotives appointed by the American Society of Mechanical Engineers, which is now working in conjunction with a similar commi tee appointed by the Master Mechanics' Association, for the reason that no road test thus far proposed can be made accurate enough to show where the causes of differences in economy lie with different types of compounds, and it may become necessary to use the shop tests for the more accurate work needed to explain the causes and locate the losses and gains in compound locomotives.

We have now in this country twelve different designs of compound locomotives, and it goes without saying that each designer claims advantages in all respects over all others, but we cannot see any reason why any of these designs should necessarily be much worse or better than any of the others, except in those cases where the designers, ignorant of the principles of compound engines, have made bad errors in arranging the valve motions. In stationary engine work the difference between the action of the Woolff type, which includes the majority of the tandems and other so-called continuous expansion engines, and the receiver type of compound, is not anything like as great as is claimed to exist between these types in locomotives, and it behooves those who claim such difference to come forward with proofs based not on indefinite data, but upon accurate and scientific tests with the best recording apparatus. Nothing else would be considered by experts in stationary engine practice, and there is no reason why locomotive designers should be asked to understand and believe without equally good evidence.

The New York and Chicago 20-Hour Train.

The New York Central has given out a definite announcement of its new fast train to Chicago, which will begin running May 14. The time of leaving New York is 3 p. m., and of arrival in Chicago 10 a. m., making the running time 20 hours actual, 19 hours apparent time. There is to be an eastbound train also, which will run at the same speed, leaving Chicago at 2 p. m. and arriving in New York at 11 the next morning. The distance through is 965 miles. About 10 miles at Chicago has to be traversed at reduced speed, so that the fast running must be done in about 19½ hours in a distance of 955 miles. This will mean just about 49 miles an hour, as against the 50.7 miles an hour of the Empire State Express. The train will probably consist of three sleeping cars and a combination smoking and baggage car, except when a dining car is taken on. This will prebably be, going west, from Albany to Syracuse and Toledo to Chicago.

The engines to be used for drawing these trains over the New York Central are already familiar to our readers. Engine 870, described in the *Railroad Gazette* of April 7, is a type of all of them, except that some have driving wheels about 6 in. larger. We understand that several more of these engines are to have these larger (7-ft.) wheels. Of the larger class "N" engines, illustrated in the *Railroad Gazette* of last week, none have yet been put in regular service, and only one has been built, in fact. On the Lake Shore & Michigan Southern the new train will be drawn by some new engines just built for that road by the Brooks Locomotive Works. These engines weigh about 52 tons, have four 6-ft. driving wheels and cylinders 17 in. × 24 in.

As everyone knows, the New York Central and the Lake Shore make up the most favorable route between New York and Chicago for high speed. From New York to Albany the grades are very easy, although there are a good many curves for the first half of the distance. From Albany to Buffalo the curves and grades are not only very easy but there are separate tracks for freight trains all the way. The only serious exception to this is the three-mile ascending grade out of Albany, going west, where a helping engine has to be used. The Lake Shore has even a larger percentage of straight line than the New York Central, there being one tangent 70 miles long. This road is also practically double track throughout, there being, we believe, only one 14-mile stretch (between Toledo and Elkhart) where the second track is not finished. Track tanks have been put in at five different points, so that the trains will make regular stops only at Erie, Cleveland, Toledo and Elkhart. We believe there are one or two drawbridges between Cleveland and Toledo at which trains have to come to a stop, but the numerous grade crossings of railroads along the line are said to be all provided with interlocked signals.

In the matter of safety at facing point switches the Lake Shore is, however, far behind the New York Central. The latter has distant signals of some kind at practically all such switches, but on the Lake Shore nearly all the switches are entirely unprotected except by the ordinary target and lamp. In fair weather and daylight most of these switches are probably visible several hundred feet away, but in fogs and storms and, to a less degree, in the uncertainties that always exist from sundown until dawn the next morning, the enginemen of these trains will have a perplexing dual responsibility—to obey the rules and yet make time. The Lake Shore road is arranged on the principle so commonly followed in the level portions of the country, that distant signals are needed only at obscure points, and that this definition means points which are *always* obscure; and, as on most other roads, especially in the West, even this principle is in many cases neglected. Where trains run regularly at the high speeds we are now considering, the true principle is to treat all switches and other like dangerous points as though they were always obscure; that is, provide distant signals for them.

The new "flyer," it will be seen, differs from the Empire State Express in several respects. It undertakes to keep up this remarkable speed more than twice as long, the rate however being a trifle slower. It will run about two-fifths of its trip in darkness, whereas the other train has daylight all the way except for two months in the winter. With three sleepers it will be a heavier train, even without the dining car. And last, but not least, it will depend for its profit largely, and probably chiefly, upon through passengers, which are comparatively few, while the remarkable prosperity of the Empire State has come from passengers who travel only from one stopping place to the next. It is said that the competitors of the Vanderbilt lines demand that the fare by the new train be made $30 through, fifty per cent. above the regular rate.

The Lake Shore will put on several other new fast trains, and the New York Central has made slight changes from the programme heretofore announced. These are reported in another column.

World's Fair Rates Again.

The situation in regard to passenger rates to the World's Fair may be said to have drifted from a state of unsettledness to one of uneasiness. The New York Central and the West Shore have made just a trifle of a concession—enough to make their competitors nervous—and the Vanderbilt roads generally show a boldness in putting on new trains and in other things, which indicates that they will not sit up nights to find out the wishes of the Pennsylvania or the Erie before making important moves affecting competitive business. The roads west of Chicago have various causes for uneasiness, as has been noted in our news columns recently. A few special trains have been run from New York, but no great amount of extra business yet appears. We believe the Western Passenger Association roads have finally put on sale round trip tickets at 20 per cent. reduction.

If passenger rates to and from Chicago are to be cut this summer probably it is better that it should be done now than later. The railroads will probably have all the business that they can do whatever rates they make, and it is quite possible that the weaker roads will have more passengers than they can take care of with comfort and safety to the people and profit to the companies. So after a little experimenting with cut rates the roads may come back to the rates agreed upon by the associations, which are really liberal, and stay there through the rest of the summer. It is certainly to be hoped that those Western roads which have already made some secret cuts will come around to the common-sense view.

Those who are anxious to meet every little cut that is reported seem to forget that nearly every experienced traffic officer has deemed it questionable if it was for the interest of the railroads to make any reduction at all in rates this summer. The probability has been that all the roads leading to Chicago, from the East at least, would have a good business, and most of them all they could do, at regular rates. They surely have had no reason as yet to reduce fares to get people to move, for no large numbers will want to go to Chicago at any price for a week or two yet, perhaps not for a month. We must remember that the reductions already announced were made more "on general principles" and to meet a general expectation of a "concession" than from any decided conviction that it was good business policy to discount 20 per cent. People expected reductions as a matter of course, and perhaps they had a right to expect them. They reasoned that the railroads always make reduced rates for excursions to great events and that they should logically make at least the usual reductions for an excursion lasting six months to the greatest show of the century. But the conditions are not analagous, and railroad officers everywhere should now realize that there has been thrust upon them the duty of explaining to "the masses" why this is so. They had better be doing this than to be cutting their own throats. Excursions may be run for a week and within a restricted area by borrowing cars from other lines and by temporary derangement of other traffic, and money may be made. But excursions that should extend over a continent and last six months would require the building of new equipment and might interfere with the movement of freight for a whole season, involving permanent loss to the railroad companies and to the whole community, for all society is now organized on the basis of a regular and prompt circulation of an immense variety and volume of material. So the World's Fair could not be reasonably considered as a mere expansion of a Christian Endeavor Convention or Grand Army Encampment. It is different, not only in degree, but in kind. The railroad companies have before them a new situation, and the way to meet it is only suggested by past experience; it is not clearly pointed out.

Russian Railroads.

There is one feature of the recent budgets of Russia in Europe that appears to be satisfactory, and to augur well for the future, and that is the increased expenditure upon and revenue from railroad construction. The revenue from state railroads, which only amounted to 2,000,000 roubles in 1879, had in 1889 risen to 33,500,000, while the expenditure had, within the same period, advanced from an almost nominal figure to about 34,000,000 of roubles annually. The total expenditure incurred by the state, as such, for railroad development in Russi had, up the end of 1889, amounted to about 237,000,000 of silver roubles, as compared with 1,582,500,000 provided by companies, public and private; but the state guarantees interest on nearly all the capital invested by the companies, and pays a very large part of it yearly. The mileage of Russian railroads, however, is still, in relation to the area and population of the country, less than that of any other country in the world with any pretensions to civilization, and in view of the gigantic projects now under consideration for railroad extensions in the future it is important to ascertain from the official records of existing lines what they have done in the past and what are their prospects in the future.

The length of railroads open in Russia increased from 13,340 miles in 1878 to 17,277 miles in 1889, being an increase of 3,938 miles only. The revenue from railroad working over the same period increased nearly 30 per cent. What, however, is even more important than the increase of gross is the remarkable increase of net revenue. The working expenses between 1878 and 1889 increased 9 per cent., while the net revenue increased by 62 per cent.; still the net revenue of 1889 was only equal to the payment of a dividend of 1.7 per cent.

The use which the people make of railroad transport does not appear to be so great in Russia as in other

European countries. The railroad accounts divide up the passengers, not, as in most other European countries, into first, second and third class passengers, nor as in Germany, into three classes, plus a fourth, but into the categories of civil, military and convict travelers, with the further subdivision of paying and non-paying. The total number of travelers of all classes in 1889 was 43,000,000, about one-fifteenth part of the number who traveled on the railroads of the United Kingdom in the same year, and one-eleventh of the number carried in the United States. Of this total 92½ per cent. were "civil" or ordinary passengers, and of all classes 6½ per cent. were military, and 1.1 per cent. were prisoners, while as regards the further subdivision it appears that 95 per cent. were paying and 5 per cent. were non-paying—the latter being, of course, a much larger percentage than that common to most of the other countries of Europe.

The average distance traveled by each passenger in Russia was 104½ kilometres, or about 64½ miles. In the United States it was 24½ miles.

The freight carried was 65,000,000 of tons, or less than one-eighth of the tonnage carried on the lines of the United States in the same year. Ordinary freight and mineral traffic, or *petite vitesse*, amounted to 84½ per cent. of the whole, and passenger train traffic, or *grande vitesse*, to only 0.28 per cent. of the whole, while military baggage, in the form of munitions of war, horses, etc., represented a further 0.29 per cent. of the whole. The traffic in animals for agricultural purposes and kindred traffic was 1.10 per cent., and the traffic for the public service, such as postal and telegraph traffic, transports, etc., made up a further 13½ per cent., of which a considerable proportion—fully one-fifth—was carried free of charge. The average haul was exceptionally long, longer than that of any other country in Europe, and longer by about 16 miles than the average of the United States, having been 143 miles.

The actual average ton-mile rate for the whole of the traffic carried on Russian railroads in 1889 seems to have been about 1.08 cents, which is, however, subject to a slight modification in consequence of the fact that about 3 per cent. of the total traffic is carried free of any charge. The average rate in the United States the same year was 0.976 cent per ton-mile. The Russian rate, it will be seen, is very low, despite the thin traffic.

The total locomotives and other rolling stock employed on the railroads of Russia in 1889 were as under—the rolling stock of Great Britain and United States being shown alongside for purposes of comparison:

	Russia.	United Kingdom.	United States.
Locomotives	6 659	16,237	29,036
Passenger cars, all classes....	7,773	65,044	24,586
Freight cars, all classes.....	135,910	526,415	1 046,980
Postal and other vehicles	257	.....	.....

Here appears the curious fact that although the freight movement on Russian roads is within eight per cent. of that on the railroads of the United Kingdom, and although the passenger movement was, in Russia, about one-half that of the United Kingdom, the rolling stock of the latter was about four times that of the former. Nor does this represent the full extent of the difference, for in Russia all but a very small part of the total rolling stock belongs to the railroad companies; whereas in Great Britain private owners run a great number of cars on all the principal lines, which must be added to the above numbers.

Of course, it is perfectly fair to argue that, the average mileage of the trains run on British railroads being for passengers one-eighth and for freight about one-fourth of the average passenger and freight mileage on Russian railroads, there is hardly the possibility of a relevant comparison—the conditions, indeed, presenting a contrast rather than a comparison.

The train-mileage of the locomotives of Russian, British and United States railroads compare as under:

	Locomotives, number.	Total train-miles, 1 = 1,000.	Average train-miles per locomotive.
Russian.....	6,659	79,6 0	119.500
British.	16.237	213,461	19,300
United States.....	29,036	660,451	22.750

It appears from this showing that the average work done by a Russian locomotive is much less than the average of an English one and very much less than in the United States. nor is this surprising, considering the slo v speed of Russian trains. There are few countries where business is done in a more leisurely way than Russia.

The New York Central's new fast train to Chicago will begin running on May 14, as stated more at length in another column. On the same date the New York and Chicago limited, the 25-hour train, will begin running over the Michigan Central instead of the Lake Shore & Michigan Southern. The second New York and Chicago limited will start at 12 o'clock, as heretofore announced, and run over the Lake Shore. The "World's Fair special," now leaving New York at 1:55 p.m., will be taken off; but the 12 o'clock train is practically a new train, nevertheless, for the World's Fair special is simply a part of the Southwestern Limited, as far as Cleveland, and of the Boston special the rest of the way to Chicago. The Southwestern Limited will start at 1 o'clock instead of 1:55. The Lake Shore will put on a new day express train each way between Cleveland and Chicago, and a new night train between Pittsburgh and Chicago, running over the Pittsburgh & Lake Erie. This train will run through, 487 miles, in 12½ hours. The Michigan Central announces one or two new through trains. A Montreal paper states that the Grand Trunk will run a train between Montreal and Chicago in 23 hours. The new line of the Wabash between Chicago and Detroit will be opened for passenger business on May 15. The distance between the two cities is 272 miles, which is 13½ miles shorter than the Michigan Central.

A contemporary has discovered that there are two ways by which the railroads may hope to control or guide legislation,—by lobbying at the capitals, and, we suppose, influencing elections; or by educating public opinion. The first method it believes to be the more expensive now and constantly growing more expensive. We might add that it must in the nature of things be temporary, as being against the laws of society, and that it is immoral. The other method is no doubt the right one,—to educate people, not only the general public but railroad officers and directors. But how? Our contemporary has a plan; it is to publish a weekly newspaper that should give the "facts concerning all departments of railway management in which the public are in any way interested." The simplicity of this plan is grand, but it strikes us that the means are somewhat inadequate to the end. Such a paper might perhaps be read by one out of 10,000 of the people of the United States if it were made interesting and varied enough. If it managed to get itself read by one out of 50,000 it would do pretty well. As it would obviously not be self-supporting, for a good while at any rate, it is proposed to have it subsidized by the railroads. But that would immediately destroy most of its influence among those people who need this kind of education. On the other hand there are numerous papers and magazines of recognized weight and of established and independent position which have been working for years to educate people in the social science of railroading, the aggregate influence of which is felt by all classes of society. They have not yet exterminated the grangers and populists and legislative "strikers" and blackmailers; but education is a tedious process at best, and most of us get it only through time and experience.

The Delaware & Hudson Canal Company has placed reclining chair cars on one of its trains between Albany and Montreal. This is somewhat of an innovation, as such cars have heretofore been almost unknown on Eastern roads. We do not remember any in regular service east of Buffalo except those on the steamboat train between Boston and Stonington, Conn. These cars have proved so popular in the West that they seem to have become a permanent feature on through trains, and there would seem to be no reason why the same result should not follow their introduction in New York and New England. It is not every passenger that prefers one of these chairs, especially when the choice is between this and a *whole* ordinary seat of one of the latest and best designs; so that a road which runs a very liberal supply of common seats can compete with much success with a road which runs the chairs, unless the latter is very careful not to permit too much crowding. But there are always a few passengers who appreciate the privilege of lying down without disrobing, and this, with the assurance of better air, in case the train is well loaded (in consequence of the smaller seating capacity of the chair car), should tend to make the chair car popular. The Delaware & Hudson cars have 33 chairs, there being two rows on one side of the aisle and one row on the other. The interior finish of the cars is quartered oak.

NEW PUBLICATIONS.

Road Masters' Association. Proceedings of the tenth annual convention.

Secretary J. H. K. Burgwin, of Grand Rapids, Mich., has just issued the proceedings of the tenth annual convention of the Road Masters' Association of America which was held at Chattanooga and Atlanta last November. The book contains a moderate padding of advertisements, and there are portraits of several of the officers of the Association.

The Coal Trade. By Frederick E. Saward, Editor of the *Coal Trade Journal*, New York City.

The revision of this valuable little hand-book for 1893 has just appeared. It is the 20th annual edition, and, as we have stated many times before, contains every item of useful information about coal production, prices, particulars of different fields etc., that can be gathered from published statistics or the very full news columns of the journal of which Mr. Saward is editor. The book contains 125 pages, of which a half-dozen are devoted to a succinct review of the past year. The book contains a number of short special articles about individual establishments.

Engineering, World's Fair Number.—As heretofore announced, the issue of *Engineering* for April 21 is a paper of prodigious size, devoted chiefly to the World's Columbian Exposition, and it is a magnificent piece of work. The reading matter fills 142 pages and the advertisements 146; but even this does not give an adequate idea of the amount of matter, as there are 10 double-page insets filled with plates and direct process views of the new Cunard steamship "Campania." The description of this steamship and its mate, the "Lucania," in deed, fill the first 40 pages of the paper, so that one settles down to the feeling that the paper is a Cunard number, before he gets to the World's Fair matter. This latter is divided into 32 chapters, and there are 153 numbered cuts besides four plates. The first four chapters are devoted to the four principal Trunk Lines between New York and Chicago, with reproductions of the best of the illustrations which the advertisements of these companies usually contain. Most of these cuts are very poorly printed, but, aside from this, the illustrations are fair for an article of this kind. After these railroad notices comes a three-page description of the city of Chicago. The main part of the article—27 chapters—consists chiefly of illustrations and descriptions of the buildings, the particulars of the work of their construction and samples of the decorations. There are architects' drawings, direct process cuts and a few woodcuts. There is little or nothing about exhibits, of course.

TRADE CATALOGUES.

The Pohlé Air Lift Pump is the subject of a small catalogue lately issued calling attention to a method of pumping liquids of any kind by means of compressed air, and without the use of many of the parts usually considered indispensable in pumping machinery. Alexander E. Schnee, 48 Exchange Place, New York, is General Sales Agent.

The Goetz Box Anchor Company, of New Albany, Ind., has sent out one of the most useful catalogues of box anchors, post caps and hangers that we have seen. The pamphlet gives prices, details and directions for specifications, which cannot fail to be of assistance to architects, inspectors and underwriters. The illustrations are colored and serve as object lessons of good and bad methods of anchoring iron and wooden beams and floor timbers in masonry.

The Hendrick Manufacturing Co., of Carbondale, Pa., have issued a small catalogue illustrating their perforated sheet metal as applied to locomotive spark arresters, deflecting plates, etc. Their standard perforations are from ⅛ in. to $\frac{7}{16}$ in. in width and ½ in. to 1½ in. in length. Plates can, however, be supplied perforated in almost any manner and of any reasonable thickness. These plates are now quite extensively used by railroad companies in place of wire netting in smokeboxes.

Brown & Sharpe Manufacturing Company; Catalogue for 1893. This compact little handbook, 3¾ × 5¾ in., has just been revised and rewritten, and now consists of over 300 pages. As most interested readers know it contains a large amount of valuable information, with illustrations, concerning milling and grinding machines, cutters, taps, reamers and the thousand other things made by this company. Since last year a large number of new designs of milling machines, slot-cutters, gear patterns, etc., have been added. The standard milling machines made by the company have been renumbered.

The Opening of the World's Fair.

The World's Fair was formally opened last Monday, and now revenue will begin to flow in, and doubtless from this time on there will be a great many visitors. But visitors going to the Fair now must not expect to find it complete and in order. On the contrary, it is very incomplete; and if the exhibits are all in place, the grounds and walks cleaned up, and the grass and shrubbery growing by June 15, a great work will have been done. To-day the grounds and buildings are in great disorder. It is impossible to estimate what proportion of the exhibits are in place, but certainly a very large part of them are still in boxes or in cars on the grounds, or on their way there. This is especially true of domestic exhibits; the foreigners have been more prompt. The buildings and grounds are littered with material, the grounds are intersected by temporary railroad tracks, and the aspect of many of the buildings is spoiled by strings of box cars; still, there is enough to see now to make it worth any one's while to take a long journey.

The beauty of the buildings and of the grounds in color and in arrangement has been described many times, and there is no occasion to attempt another description now. Indeed any description that can be made is entirely inadequate. It is simply impossible for words to convey to the human imagination any notion of the beauty of the whole composition; it is more than beautiful—it is splendid. Probably it is impossible to find anywhere a finer picture than the lake and the sky seen through and beyond the peristyle, unless it is as one stands by the peristyle and looks back at the noble dome of the Administration Building shining in the sky; but these are merely parts of a vast composition which is marred only by two great mistakes. The coloring of the Transportation Building is atrocious, and the design of the Government Building makes patriots weep.

Inside the buildings there are enough exhibits in position to occupy many well spent hours. Those of the Transportation Department are pretty well advanced, and within a week will be in good order. Machinery Hall will get settled more slowly, but is already extremely interesting; and the exhibits in the Department of Mines include some most admiral displays of iron and steel work.

The most interesting feature of the opening day was the transportation of the crowds. It is estimated that the total attendance amounted to over 300,000. The estimate of the capacity of the local transportation lines, which was published in the detailed article on this subject which appeared in the *Railroad Gazette* of April 21, gave a maximum hourly capacity each way of about 110,000 persons. Of these, 40,000 an hour were allotted to the Illinois Central, 12,000 to the Alley Elevated Railroad, 25,000 to the cable railroads, and 30,000 to the lake steamers.

It is imposible to tell how many of the total number of passengers carried by the transportation lines on Monday were carried north and how many were carried south, or how many were carried in any given hour, but it will be interesting to consider the totals and some of the conditions under which this great traffic was handled. It seems probable that no other day this summer will there be very many more people to be carried to the World's Fair grounds than were carried on Monday, and we may conclude threfore that if the arrangements are adequate now, or are such that they can soon be made adequate under the lessons of Monday, the problem of local World's Fair transportation is pretty well settled.

The total number of passengers carried by the Alley Elevated on Monday was, in round numbers, 200,000; the trains run consisted of seven cars and of five cars, probably averaging about six cars to the train, and the intention was to dispatch them at intervals of four and one-half minutes, but during the day there were various times when the interval was longer than this. Before six o'clock in the morning the trains began running with aisles and platforms loaded, and the station platforms and stairways were crowded. Within an hour the crowd at all the stations became a jam; at Congress street especially it extended down the stairways and for at least a block up the street. The southbound trains were dispatched as rapidly as possible, and many of them run through without stopping at the local stations, and the consequence was that many of those taking the trains at intermediate stations waited two or three hours before they could get on board. The trains were run into the grounds, delivering passengers at the new terminal on the roof of the Annex to the Transportation Building, and the trains leaving the grounds were loaded at the same point, although many persons left the grounds on foot and boarded up-town trains at other stations. The same difficulty was met in getting people away from the grounds in the afternoon and evening as had been found in getting them to the grounds in the morning.

The question comes up whether or not the facilities of the Elevated Railroad can be increased so far as to materially better the conditions found on Monday. Undoubtedly there will be some improvement made very soon, although the service is to-day admirably organized. The rolling stock is very fine; the engines handled the seven-car trains with perfect ease, starting them on a curve of 90 ft. radius without the least trouble, and the excellent brake equipment supplemented the ample engine power, and all the stops and starts were as smooth as can be made on any railroad. The cars are almost identical with those of the Manhattan Elevated in New York, but the end doors are double, sliding both ways, and the platforms are wider than those of the New York cars, and consequently cars can be loaded and unloaded more rapidly. Still, it is the opinion of the operating officers of the road that it was a mistake not to have built the cars with side doors. The car equipment is insufficient in quantity, for with more cars trains would be started not only from the northern terminus at Congress street, but from Twelfth street and from Thirty-ninth street. Similarly, they would be stopped at one or perhaps two stations before getting into the World's Fair grounds and started northwardly again from, say, three stations. As it is, all trains are run through, and the room at Congress street is singulary inadequate for such traffic, as all trains have to enter and leave from a single track stub. There was a good deal of complaint of inadequate provision for selling tickets and the inadequate size of the stairways, but the limit was placed by the number of people that could be moved in the trains, and any additional facilities back of that would only have resulted in further crowding the station platforms.

The World's Fair terminal of the Elevated is not yet entirely completed, the interlocking plant is not in, and the platform, railings, ticket wickets, etc., are still incomplete. When these matters are finished trains can be handled with more comfort at any rate, but perhaps with no more dispatch.

The platform men and trainmen did wonderfully well considering the large number of comparatively new men. It is apparent after a little observation that the President, Dr. Barnard, has succeeded in establishing fine discipline among his employés. With a little more experience they will be as good elevated railroad men as those in New York City. The process of educating the passengers, however, will necessarily be a slower one, and this has been one of the great difficulties in handling the Chicago traffic; the people are very turbulent and intolerant of restriction.

The Illinois Central Railroad carried about 185,000 people on Monday. This route will be in some ways more convenient and comfortable than the Elevated, and in some ways less so. It has more tracks, more cars, more stations, and can move more trains. On the other hand, it will land all of the passengers outside of the grounds, the nearest station being about 100 to 150 yards away, as it has been decided to run no Illinois Central trains from this city into the grand terminal station at the grounds. The arrangements which this railroad has made for handling the World's Fair traffic have been carefully described in earlier issues of the *Railroad Gazette*, especially in that of April 21. It will be remembered that two tracks are set apart for World's Fair traffic alone, and that on these it is proposed to run the open cars provided for that traffic and to make no stops between the World's Fair station at Van Buren street and the stations near Jackson Park. As a matter of fact, however, it appears that on Monday more World's Fair traffic was carried on the suburban tracks than on the special tracks, although the fare charged was over twice as much It is supposed that this arose from a notion on the part of the public that the regular suburban cars would be more comfortable and less crowded. At any rate, the crowd on that road was less than on the Elevated, and the number of passengers carried considerably less. It seems possible that these conditions will be reversed shortly, as people learn that with the greater facilities offered by the Illinois Central they are likely to find more room there than on the Elevated; but both of these roads will undoubtedly have all that they can do.

The steamer traffic on Monday was insignificant. Eight steamers in all appear to have been run by two companies, but they were all small, no one of them carrying more than 700 passengers, and as the round trip takes about two hours it is quite obvious that they could make very little impression on the traffic. In fact, it is said that one company had a steamer ready to run which was not sent out at all, as not enough business offered. This way of getting to and from the Fair ought to be very popular and important and probably it will become so as soon as the large fast steamers which have been promised are provided. In fair weather, with a smooth lake, this will be the most comfortable and the most picturesque and impressive way of reaching the grounds.

A very heavy business was done by the cable roads and street cars, but how many passengers they carried in all has not yet been reported. At the time of the dedication last October the South Side cable roads carried 600,000 people in one day; it is said that on Monday that company carried but 400,000. Of course these figures include passengers moving both ways, as well as the very large traffic which did not go to the World's Fair grounds at all.

Only six trains were run into the great terminal station in the grounds, carrying 3,000 people; the tracks there are still largely occupied by freight cars. Three trains were run by the Chicago & Northern Pacific, and the Baltimore & Ohio jointly. It is proposed to run trains from the Northern Pacific, Wisconsin Central, Baltimore & Ohio, Pittsburgh, Ft. Wayne & Chicago and Lake Shore into this station, and eventually a considerable number of people ought to be very pleasantly accommodated in this way. Still, at best, the colossal yard, train house and depot building are far beyond any possible use that can be made of them for passenger service. The tracks have probably not been much beyond the needs of the freight service during the time of the installation, but the depot building has been one of the few undoubted mistakes in the preparation for the Fair.

Specifications.*

The contractor is entitled from a business point of view to a reasonable profit upon the work executed, and I think you will find it the universal testimony of experienced engineers that were it within their power they would never allow a contract to be made, which did not contain the expectation of a reasonable profit to the contractor. This is not to be understood as meaning a profit to the contractor under all circumstances, but only upon the condition that the work has been properly and economically executed. . . . The universally recognized principle in all business, that the expected interest or profit from any investment must be in proportion to the risks, applies also to the execution of engineering works. I consider it important to impress upon you this principle, for it is not always borne in mind by those whose careers run in professional lines.

Some years ago, it was deemed important to build the piers for a bridge at a most unfavorable season of the year, in a river subject to sudden and severe floods. It was recognized that the chance of loss of the uncompleted work would be very great; the importance of the new connection was considered as sufficient to justify the attempt. Only one contractor of those invited to bid would give any figures for executing the work. He submitted with his bid an estimate of the cost of doing the work, and to this he had added a profit and a lump sum to reimburse him for the possible loss of his plant and such part of the work as would be liable to destruction if a flood should occur during the execution of the work. The offer was accepted, and by promptness of execution and a favorable season, the work was completed without accident; the contractor necessarily and properly making a proportionally large profit.

At a future date an engineer appointed to report upon the expenditures in the interest of an opposing faction noted this work as an extravagant one, because the prices per cubic yard were far above the customary prices in that region. The work having been under my supervision I was called upon for an explanation. Upon presenting the facts of the case the action was approved as in accordance with correct business principles.

Failure to recognize this principle that the contingent profit should be in proportion to the risks, sometimes causes great injustice to worthy parties who are allowed to enter upon work in which the parties in control, fully realizing the great risks, know that the contractor's contingent profit is in no manner proportional to the risks involved.

The United States Lighthouse Board (in their report for June 30, 1890) recommend the awarding of the contract for the construction of the Hatteras lighthouse, off the Outer Diamond Shoals, upon a plan and bid which they state contains a profit to the contractor of only nine per cent., *upon the supposition that he sustains no losses*. In other words, upon a work where the risks were considered so great that the contractor was to construct and operate the lighthouse for a year after its completion without receiving any payments; for the construction of which there were no precedents; which is a work so important to our great commerce that a nation like the United States should construct it regardless of its cost; the agents of this great nation demand a structure, upon which the contractor has but 9 per cent. to cover contingencies. An absolute profit of this amount would be expected for the construction of a country barn.

The contractor to whom the above contract was awarded attempted to execute this contract; he lost his caisson and plant within a few days after reaching the shoals, and was compelled to abandon the contract after losing a sum of money amounting to about 20 per cent. of the contract price. Within a short time it has been stated that the Lighthouse Board have prepared plans for this structure, which they estimate can be built within the appropriation ($500,000), and give the contractor a profit of $20,000, or 4 per cent.

If we recognize the principle that the contingent profits must be in proportion to the unknown elements and the risks involved in the execution of a proposed work, it becomes the duty of the engineer to reduce these unknown features to a minimum, as far as may be possible, before receiving bids. . . . Engineering specifications are the detailed particulars supplementing and explaining the plans of any piece of work, and governing the character of the materials and the methods of construction to be used. Or where unaccompanied by plans they are the rules and directions under which any work is to be designed and executed. Their purpose is a twofold one; first: They are to enable bidders upon any work to understand fully the character and extent of the work, and what they are expected to furnish and what to do, in order that they may be able to make suitable estimates upon which to formulate an intelligent and proper bid. Second: They are, in connection with the plans, to serve as the reference in regard to all questions as to qualities of the materials and workmanship, during the execution of the work, in order to avoid misunderstandings between the engineers and the contractors; the contractor not being allowed to furnish poorer or less suitable materials and workmanship than is here specified, nor the engineer to demand any better without giving an extra compensation.

Nothing serves better to obtain the best class of contractors and to obviate much of the friction which occurs during construction between the engineer and the contractor, than a good specification, carefully and clearly expressed. A loosely drawn and incomplete specification is always attractive to the worst class of contractors, or those who do not intend to do an honest job, and who will take advantage of every weak point to get all they can out of the work. . . .

As the specifications and plans are intended to supplement and explain each other, the specifications must be full and explicit upon all points, which cannot be or have not been fully represented on the plans, and for brevity it is seldom customary to repeat or describe in the specifications features which have been fully illustrated upon the drawings. It is done sometimes, however, for special reasons. . . .

Of course you will understand that it is not always practicable to obtain the exact normal dimensions in any work of magnitude; a rock cut, tunnel, embankment, etc., cannot be expected to conform exactly to the neat lines of the plans. Even in a metal structure, like a bridge or piece of machinery where each part has been given a definite shape and dimension, there will be a variation of weight due to the practical limitations of accuracy in the processes of manufacture. A reasonable variation must be expected and considered for each case, for it must be paid for in one way or another. By proper provisions of the specifications this variation can usually be restricted within reasonable bounds.

In metal structures it is usually specified that the variation of the actual weight from the theoretical weight, as shown by the dimensions of the parts, must not exceed a certain percentage (usually 2½ per cent.) or such excess will not be paid for; this gives the contractor a sufficient allowance for practical variations in the material, and, at the same time, does not give him enough latitude to favor a tendency in either direction. In some cases it may be the best policy to restrict the payments to the actual quantities as shown by the neat or normal dimensions, in order to avoid careless work or undue payments, through favoritism, or political or personal influence. Of course this does not mean that such variations from the neat dimensions, as are to be expected under the best of management, are not to to be paid for indirectly. The experienced and intelligent contractor will simply determine the cost of doing the work in his way, then assess the full cost plus his expected profit, upon the neat quantities and thus determine the unit prices upon which to base his bid. Before preparing a specification it will be necessary to decide whether the best policy is to place all the risks for the execution of the work upon the contractor, or to have the company assume part or all of the risks.

It is the duty of the engineer to place before the contractor all the facts he may possess affecting the execution of the work. The engineer and the contractor can both form an estimate of the possible risks, according to their individual experience of similar work. The contractor's estimate of such risks will, as before explained, be incorporated in his contract price and must be paid for by the company. It is well to consider if the estimate put upon these risks by the contractor is a fair one under the circumstances. If it is exorbitant and out of proportion to the anticipated risks, it may be considered best by the engineer or his employer for the company to assume the risks in some form or other.

Or it may be that the risks are of such a character they cannot or should not be placed on any other party. As an example, many railroads erect their own bridges and build all work which in any manner could interfere with the safety or proper operation of their train service, where the risks are such that injury may fall upon the company through the ignorance or carelessness of the contractor or his forces, a power of control and di-

*Extracts from a lecture by Theodore Cooper, C. E., before the students of the Rensselaer Polytechnic Institute.

rection should be more explicitly retained in the engineer than where such losses fall solely upon the contractor. . . .

As it is the engineer's duty to determine whether the specifications are being complied with, he must be able to determine and decide if the materials and the workmanship are of the desired kinds. He should therefore know before drawing up the specifications what materials and what class of work are needed, and make the same clear, so that the contractor can have the same knowledge.

The average contractor is quick to discover the engineer's want of knowledge and is prone to take advantage of it. Make it your study, then, to know thoroughly the various classes of materials and work, so you can define them in the specifications, and also know whether you are getting them during the construction; otherwise your ignorance will soon be found out and advantage taken of it by the less scrupulous contractor. Or, on the other hand, you may do an unfair act by making a well-meaning and honest contractor replace by your final "best" something which he had a right to think was the intended article.

Do not use ambiguous terms or expressions. Do not lay traps for the contractor; it is not an honorable act. The contractor has his rights, and the engineer who fails to give equal consideration to the rights of his employer and the contractor, in the execution of any work, falls short of duty. Remember that your position as an "engineer" is something higher than that of an advocate or partisan; that while you are bound to render loyal service to your employer, by devoting to his service your time and talent, such service may not pass the bounds of truth, honor or justice. One of the highest honors of your profession is the attainment of such a reputation that both parties to a contract willingly accept your decision as final in all matters of dispute. Neither have you the right to insert such clauses as "to the satisfaction of the engineer" or "as may be directed by the engineer," to be afterward used for obtaining more or better material and workmanship than would be expected from the context of the specifications. They can, however, be used to cover work or material which could not, under the circumstances, be otherwise defined. Or they can be used to relieve the contractor, under special conditions, by accepting some other material or work than the specified ones if the engineer considers the same as satisfactory and more expeditious. . . .

Avoid as far as possible specifying proprietary articles or processes, as somebody's paint or cement, somebody's forms of iron or steel, somebody's valves or special mechanism. Usually the merits of any desirable material or process can be defined, so that if there be others, perhaps unknown to you, which are equally good, they may be allowed to be used. It is a natural tendency, after having had a favorable and satisfactory experience with some particular thing, to desire to specify it for other cases, and you will be constantly requested to do so by the persons interested in it. You will find, however, that such action tends to two results which are undesirable: first, a suspicion that you had an interested motive for thus specifying, and, second, that you are paying more for these things than you would have done under a free competition. . . .

Be careful to consider the specification as a whole, and not solely as a collection of disjointed clauses, part of which you may select at random, and part reject. Frequently the various clauses are so correlated that taken separately the intention of the specification is lost. By comparison of different specifications of well recognized merit, you will frequently find that while each may produce equally good results they accomplish this purpose by different methods or on different theories. By endeavoring to compile a common specification from these several specifications without proper judgment, as is not infrequently done, a worthless and often absurd result is produced. In compiling a specification by the use of old and clearly defined clauses, do not, without good reason, attempt to change their wording. You may reduce the force of such clauses by permitting a new interpretation, and lose the strength of an accepted interpretation by other engineers and contractors. . . .

The question often arises, under a general specification, why certain things are required or are forbidden, because there does not appear in some particular case any reason for the clause. Or, again, there may be clauses which have no bearing in a certain character of designs or certain kinds of work. If, however, the specification is an accumulative growth, as every good specification must be, it will be found that these requirements have an application either to some fault that may have been corrected by their existence, or else that these clauses are needed in the great mass of cases, and it is better to maintain them for the particular case under consideration than to create an exception.

Do not attempt to rush into new things until you have exhausted the capabilities of the things which are readily obtainable. For general classes of work you will find it better, both in time and money, to make use of the ordinary methods and those materials which are accessible. There is no better illustration of the difficulties to be expected from an attempt to obtain new materials and to use new methods, or the possibilities of accomplishing excellent results from the means and methods readily obtainable, than a comparison between two important and well known structures, viz., the St. Louis and the Washington bridges, two of the largest and most expensive arch bridges in the world.

Both of these bridges were constructed and erected in place under my supervision, so I have knowledge of the comparative difficulties of their construction, and the relative merits of the methods employed.

The St. Louis bridge has three arches, two of 502 ft. and one of 520 ft., clear span. The Washington bridge has two arches of 510 ft., clear span. The total metal, however, in each bridge is not far apart: that of the St. Louis bridge being about 12,000,000 pounds; that of the Washington bridge being about 13,500,000 pounds. The metalwork of the St. Louis bridge cost $2,120,000, while the price for the Washington bridge was $845,000. The time required for the construction of the St. Louis arches was four years and four months. The time required for building the Washington bridge was only two years and five months.

Of course, in considering these two cases we must allow for the better facilities we now possess for the construction of bridges, and also for the experience gained during the intervening years; but nevertheless they illustrate the principle I wish to impress upon you viz, the extra cost and increased difficulties accompanying the demand for new and special materials and processes. The special design of the St. Louis arches required that new and special machinery should be constructed for manufacturing the shapes and for working these shapes into the finished members. The contractors lost a great deal of money before any successful results were reached. Not only were the forms of material new and difficult to manufacture, but they were also required to be made of a new material, chrome steel. The manufacturers after great losses, finally succeeded in making the shapes satisfactorily, but not with chrome steel. The recurring failures, delays and accompanying litigation added largely to the cost of an already expensive work. Even with the increased facilities we to-day possess for manufacturing structural work, the St. Louis bridge would be a costly piece of construction if made on the same plans and specifications. Any one who contemplates the execution of an important work on some new plan or with some new and untried material cannot fit himself better to appreciate his task than by reading the history of the St. Louis bridge. The Washington bridge, on the contrary, demanded no forms or kinds of materials that were not readily obtainable, nor the development of any expensive machinery. That this latter bridge is in any manner a less worthy structure, or is less creditable to our common profession, would scarcely be claimed by any one who is acquainted with the two bridges.

Losses in Transmission of Heat.*

The distribution of steam from a central boiler plant to separate engines is often practiced; and the amount and character of the losses which occur will no doubt be of general interest. The discussion of such losses as occur in the transmission of steam, either for heating or power purposes, is the principal subject of this paper.

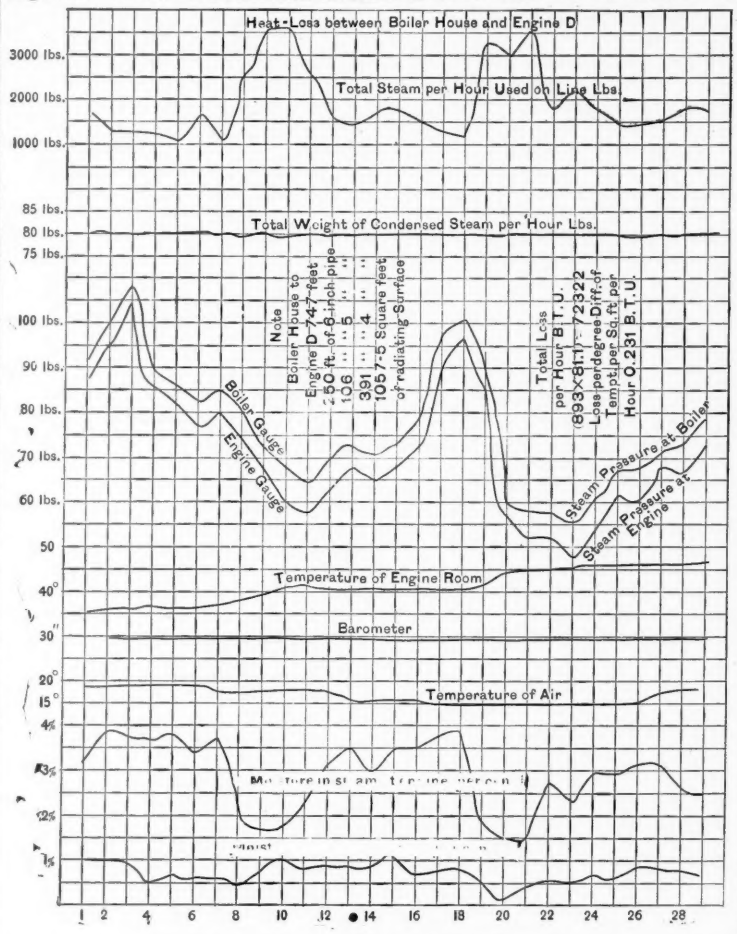


Fig. 7—Losses in Transmission of Heat.

Heat for the buildings of Cornell University is obtained from a boiler plant at Sibley College, on the north side of the Campus, and is transmitted by pipe lines laid underground to the various buildings constituting the University.

The pipe is laid in nearly a direct line to the various buildings, and is protected from heat losses by a wooden pipe, the pipe being made of a solid log, from which the central portion has been removed by a cylindrical saw. The bore of the wooden pipe is 2 in. greater than that of the iron pipe which is inclosed, and the thickness of the wood wall composing the pipe is 4 in., thus making the outside diameter of the wood pipe nearly 10 in. greater than that of the inclosed iron pipe. The outside of the wood pipe is turned, protected by a spiral winding of hoop iron, and coated on the outside with hot coal tar and sawdust. It is seen that it insures for the steam pipe an air space of nearly 1 in., and 4 in. thickness of wood covering (fig. 1).

The line consists of 150 ft. of 10-in. steam pipe, and 2,050 ft. of 6-in. pipe, having a total heating surface of 5,605 sq. ft. The pipe line was laid in 1889, and the test was made by Mr. Churchill within a few months of its completion.

For ascertaining the heat losses, Mr. Churchill employed several methods. In one method sections of the line were taken, and calorimeter observations made on the steam as it entered and left the line. The result of this investigation indicated a loss of heat in a distance of 2,025 ft. of nearly 10 per cent. of the heat transmitted. The other method of determining the loss was to ascertain the amount of heat required to keep the line heated to its working condition, this being done by closing off all the buildings, and making certain that there were no leaks existing in the line. The heat required was determined by a boiler test.

Three trials were made, the results being as follows:

TABLE I.—LOSS IN BRITISH THERMAL UNITS.

	Difference of temperature.	Total per hour.	Per degrees difference of temp.	Per sq. ft. surface.
1st trial.....	241°	1,021,370	4,237	.755
2d trial.	235°	811,047	3,452	.614
3d trial.....	236°	932,110	3,901	.712

The first trial was made when the ground was very wet, and some soil water reached the pipe. The third trial was made under unfavorable circumstances. For these reasons the second trial is considered as giving results which represent the pipe line under best conditions.

The loss per square foot for a naked pipe, under the same conditions would have been 570 B. T. U., which is equivalent to 2 B. T. U., for each degree difference of temperature. That is, the heat loss in the plant tested is 30.7 per cent. of that in a naked steam pipe.

Loss in Transmission of Steam for Power.—The surplus coal of the Lehigh Valley system, designed for the New York market, is unloaded by the Dodge system of coal handling machinery, stored in enormous conical piles at South Plainfield, N. J., and then reloaded as the state of the market demands. The coal is distributed on either side of the track for a distance of 1,500 ft. The unloading and reloading machinery is heavy and requires in each case enormous power, which is only in occasional use, so that the problem in this case is the most efficient distribution of power to the various coal handling plants. The system adopted was that of independent engines, provided with steam from a central boiler plant.

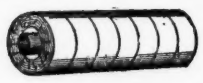


Fig. 1.

The steam is conveyed to the engines in piping which is protected from heat radiation by the Wyckoff covering as now manufactured at Elmira, N. Y., by A. Wyckoff & Son. It consists of two concentric octagonal pipes, each built of 1-in. plank, and separated from each other by a very thick layer of waterproof paper. The form of this covering is shown in figs. 3 to 6. Fig. 3 represents a section of the casing complete. Fig. 4 shows pipe with a portion of the outer covering removed, showing paper. Fig. 5 shows coating removed from two staves, showing galvanized wire with which casing is wound. Fig. 6 shows the manner of casing tees and elbows. The top is put on with screws, and can be easily and quickly removed when necessary. The steam pipe is laid in the centre of the wooden pipe, and is surrounded by an air space about half an inch across.

At South Plainfield this pipe was not buried in the ground, because of the wet character of the soil and the difficulty of securing proper drainage, but was left on top of the ground, and protected by a rough wooden box constructed of 2-in. plank.

The test of heat losses was made by myself, assisted by Messrs. Dunn and Mack, of the class of 1893, in Sibley College, Cornell University. The test was made only of the West line, and was confined to measurements of the loss of heat between the boiler house and D engine. The test was made Feb. 17, 1893, and was of eight hours' duration.

Total length from boiler house to D engine, 747 ft., consisting of 250 ft. of 6-in., 106 ft. of 5-in., and 341 ft. of 4-in. pipe, having a total radiating surface of 1,057.5 sq. ft. The line leading from the boilers is of 6-in. pipe to E engine house, then 5-in. pipe to the branch leading to A engine house, and the remainder of the distance is 4-in. pipe.

The general method of testing adopted was such as to give information, first, as to the amount of water in the steam as it entered the steam pipe; second, the amount of water in the steam as it reached the engine; third, the amount of water collected at intervening drips; fourth, the total, amount of steam used; fifth, the fall in pressure between the boilers and the engine. These determinations were made as follows: The amount of water in the steam was determined by a throttling calorimeter, the sample of steam being drawn, in each case, from a vertical pipe located close to a bend from a horizontal, and collected by a half-inch nipple extending past the centre of the vertical pipe. The drip was caught at places which had been provided in the pipe, and was weighed from time to time.

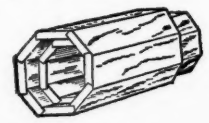


Fig. 3.

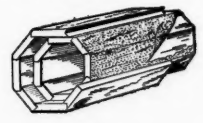


Fig. 4.

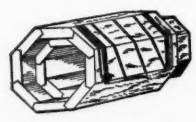


Fig. 5.

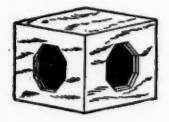


Fig. 6.

Simultaneous observations of the quantities given in the summary were taken every ten minutes. A study of the summary shows that the loss was sensibly constant during the run. This is clearly shown by noting the fact that any increase in the amount of steam flowing through the line had the effect of decreasing the percentage of moisture at the engine.

The total loss per hour was equivalent to that required

* Extracts from a paper by Prof. R. C. Carpenter, Cornell University.

to evaporate (36 + 45.1 = 81.1) pounds of water from a temperature of 212° F., to a pressure of 70.1 pounds by gauge. This is equal to (81.1 × 893 =) 72,322 B. T. U. The average steam pressure was 70.1 pounds by guage, its temperature 313.6° F., the average outside temperature 16 6° F., hence the difference of temperature was 297°. The loss for each degree difference of temperature becomes (72,322 ÷ 397 =) 244.2 B. T. U. per hour. The total radiation surface was 1,057.5 sq. ft., hence the loss in B. T. U. per square foot per hour was 0.2315 per degree difference of temperature.

The loss for a naked steam pipe under the same conditions would have been 2.93 B. T. U. per square foot of surface per hour, or the loss of the covered pipe is reduced to 7.87 per cent. of the bare steam pipe. The entire loss for the transmission is equal to the coal needed each hour to evaporate 81 lbs. of water, which can be approximately stated as 10 lbs., since the evaporation of 8 lbs. of water by 1 lb. of coal is not an unreasonable assumption.

The diagram shows the variation in the various quantities which occur at each observation during the test. It will be noted that the total loss expressed in pounds of steam condensed remained practically constant. This has the effect of decreasing the percentage of moisture present in the steam when the total amount of steam passing through the line increased. It is also of interest to note the parallelism of the two lines which represent respectively the pressure at the boiler and at the engine, nearly 750 ft. distant.

These figures compare favorably with any other method of power transmission, even when the fact is considered that the line during the winter months is kept hot night and day, while the power is actually used only during the day.

A comparison of two methods of protecting steam pipe shows the following. Column A is for pipe under ground and protected by solid wood piping with shell 4 in. thick. Column B is for pipe in square wooden box and protected by the Wyckoff covering 2 in. thick:

	A.	B.
Loss in B. T. U. per sq. ft. of surface, and per degree difference of temperature	0.614	0.
Per cent. that loss bears to that of a naked steam pipe under the same conditions	30.7	7 9
Relative value of covering	1	2.66

Summary and Conclusion.—The loss in transmitting power by any system is largely constant, and hence when the power is greatly increased the percentage is correspondingly reduced. The following estimate is based on the transmission of 100 H. P. 1,000 ft:

Method of Transmission.	Percentage of Loss.
Line shafting:	
Loss by friction.....(average 25)	15 to 40
Electricity:	
Loss in transforming from mechanical to electrical, and vice versa	20 to 30
Line loss	2 to 5
Total loss	22 to 35
Conveying steam:	
Naked steam pipe (still air)	37.6
Pipe covered with solid wood and earth	11.2
" " " Wyckoff's covering	4.2

SUMMARY OF TESTS OF LOSS OF HEAT, LEHIGH COAL STORAGE PLANT, SOUTH PLAINFIELD, N. J.

No.	Gauge Pressure. Boiler.	Gauge Pressure. Engine D.	Temperature. (a) (b) Boiler house.	Engine house.	Outside air.	Calorimeter entering steam.	Calorimeter steam at engine.	Moisture in Steam. Entering steam.	At engine.	Increase.	Total weight of steam in line.	Remarks.
	lbs.	lbs.	F°	F°	F°	F°	F°	Per ct.	Per ct.	Per ct.	p h. lbs.	
1	92	87	38	36	19	275	228	1.0	3.2	2.2	1700	
2	101	96	...	37	19	....	213	1.0	3.9	2.9	1300	
3	108	105	...	39	19	....	213	1.0	3.8	2.8	1305	
4	89	86	38	38	19	284	217	0.5	3.7	3.2	1190	
5	86	82	38	38	19	280	214	0.65	3.8	3.15	1080	
6	83	77	38	38	19	280	220	0.6	3.4	2.8	1700	
7	85	80	38	38	18	283	214	0.49	3.75	3.26	1100	
8	80	74	38	38	18	281	247	0.45	1.9	1.45	2500	
9	73	67	44	40	18	272	243	0.75	1.7	0.95	3600	
10	68	59	42	40	18	264	239	1.03	1.75	0.72	3600	
11	64	58	46	41	18	266	229	0.75	2.25	1.50	2510	
12	70	63	38	41	18	267	216	0.9	3.2	2.03	1600	
13	73	68	38	41	16	270	213	0.85	3.5	2.15	1500	
14	71	65	38	41	16	268	225	0.85	3.0	2.15	1800	
15	73	68	38	41	16	264	213	1.2	3.5	2.3	1800	
16	78	73	38	42	16	275	214	0.7	3.5	2.8	1500	
17	98	91	38	42	15.5	282	212	0.75	3.8	3.05	1300	
18	101	97	38	46	15	284	220	0.8	3.9	3.01	1200	
19	88	86	38	47	15	282	251	0.6	1.95	1.35	3300	
20	59	58	42	47	15	282	250	0.0	1.5	1.5	3000	
21	58	52	42	47	15	282	239	0.45	1.5	1.5	3650	
22	58	52	48	47	15	267	214	0.55	2.8	2.25	1800	
23	56	48	50	48	15	267	222	0.5	2.3	1.8	3200	
24	61	55	50	48	15	267	212	0.75	3.0	2.25	1800	
25	68	62	50	48	15	266	212	0.6	3.0	2.4	1500	
26	68	60	50	48	15	266	214	0.9	3.2	2.3	1500	
27	72	68	50	48	15	270	213	0.8	3.2	2.4	1600	
28	73	67	50	48	18	270	228	0.8	2.6	1.8	1800	
29	79	73	50	48	18	276	228	0.65	2.5	1.85	1800	

Remarks: Engines D and A run light. | Engine D loaded, E running light. | E Engine run light. Eng also light. | E Engine start. D running light. | E Engine on running light.

Average amount of water caught in drips, 45.1 pounds per hour.

A erage amount of water indicated by calorimeter, 36 pounds per hour.

TECHNICAL.

Manufacturing and Business.

The Schultz Bridge & Iron Co., of Pittsburgh, has closed a contract with the Akron Steam Forge & Iron Co., Akron, O., for the erection of a new forge and machinery building, for which about 270 tons of structural material will be required.

The Marshall Car Wheel & Foundry Co., of Marshall, Tex., has decided to establish a large plant at Houston Heights, Houston, Tex., to manufacture car wheels and general railroad castings.

Messrs. O. Chan. Wells and Charles A. Coutan, sales agents in New York of the Crosby Steam Gage & Valve Co., have retired, to engage in the manufacturing of Standard steam vacuum and other gages. They have been appointed sales agents for J. E. Lonergan & Co., manufacturers of pop safety, water relief and snifter valves, etc.

The Brown Nut Lock Co., of Chicago, has been incorporated with a capital stock of $600,000. The incorporators are Julius C. Brown, J. C. Le Masters and James W. Wilson.

The Kreihbel Palace Car Co. has been incorporated in Illinois. The incorporators are William E. Schrader, Howard A. Baldwin and Frank B. Redington.

The Ingersoll-Sergeant Drill Co. has removed its New York offices from No. 10 Park Place to the Havemeyer Building, Cortlandt, Church and Dey streets.

The National Hollow Brake Beam Co. has brought suit for infringement against the American Brake Beam Co., of Detroit.

F. A. McArthur, formerly connected with the New York Air Brake Co., has accepted a position with the Thacher Car & Construction Co., and will have charge of its exhibit at the World's Fair.

Iron and Steel.

The Wheeling Steel & Iron Co., of Wheeling, W. Va., is preparing plans for extensive improvements at Benwood, W. Va. The additions to the plant will include a new blast furnace, a mill for the manufacture of structural steel and bridgework, and a pipe mill. Ground for these additions has been bought. Bonds to the amount of $100,000 have been issued.

Ground has been broken at Cumberland, Md., by the Cumberland Iron & Steel Shafting Co. for two buildings, one 78 × 180 ft. and the other 80 × 283 ft. The company will manufacture polished iron and steel shafting. Merwin McKaig is President of the company and W. J. Muncaster General Manager. The factory will be started up next September.

New Stations and Shops.

The new machine shop for the Eastern Forge Co., of Portland, Me., will be designed and built by the Berlin Iron Bridge Co., of East Berlin, Conn. The building will be 57 × 150 ft., and will be entirely of brick and iron with all modern improvements.

The foundations of the buildings, comprising the shop plant of the Great Northern, at Spokane, Wash., have all been laid and the erection of the brick walls is well under way. N. D. Miller, Chief Engineer of the company, is now receiving bids for the steam heating plant of these shops.

Electric Trolley Patents.

After several years of contention and interference before the Patent Office two broad fundamental patents have been granted to Charles J. Van Depoele, covering all the essential features of the trolley for conveying the electric current from an overhead wire to a moving car. The patent is assigned to the Thomson-Houston Electric Company. In detail, the claims allowed cover first, the underneath contact made either by a rolling wheel or a sliding spoon contact piece; secondly, the converse of these two cases, and, thirdly, the reversibility of the trolley pole on top of the car, enabling the contact to be made on either side of the trolley, as the case may be. The possession of this patent practically means the entire control of overhead trolley apparatus throughout the United States.

The Erie Engineers' Locomotive.

The locomotive, "E. B. Thomas," built by a stock company of Erie engineers, fully described in the *Railroad Gazette*, March 10, has been delivered at the World's Fair grounds. The materials contributed by makers were: Boiler steel by the Otis Steel Company; tubes by the National Tube Works; axles, rods, crank pins and tires by the Midvale Steel Works; injector, oil cups, etc., by the National Lubricator Company; clock by John McErain.

Johnstone's Double Locomotive.

Mr. F. W. Johnstone writes us that the tests of the double end locomotives of his design have progressed sufficiently to satisfy him that the locomotives will prove to be a success. He says they develop ample power and curve very freely. Some delay was experienced by the breaking in bad welds of some of the rocking levers that are subjected to severe strains, but these are now being repaired in the Mexico shops of the Mexican Central, and the locomotives will be running in a few days. These locomotives were illustrated in the *Railroad Gazette* of March 25, 1892, and the peculiar valve motion, the design of Mr. Johnstone, in the issue of April 8, 1892

Storage Battery Street Cars in New York City.

During the past two weeks several trial trips were made with storage battery cars on the Second Avenue (surface) Street Railroad, New York, the trials having been preliminaries to the forthcoming general introduction of the cars on one section of this line. The electric outfit was furnished by the Waddell-Entz Electric Company, of Bridgeport, Conn., and 203 Broadway, New York. The storage battery cells used are of the copper-zinc type, generally considered and claimed to be the lightest form in proportion to the power stored. The motors and charging dynamos are of a special type introduced by these makers about two years ago. Altogether there are now ten cars on the line equipped with the batteries and motors, and it is expected that by June 1 that portion of the line from Ninety-sixth street north will be exclusively operated by them. If the results on that portion prove satisfactory it is the intention to adopt the electric cars on the whole line.

The cars, as now equipped, are said to be able to run 30 miles without recharging of batteries, and the latter, for each car, weigh 4,000 lbs. The charging station which has been built at 127th street and Second avenue contains two 100-H. P. Worthington water tube boilers, two "Ideal" automatic engines of 75 H. P. each, and two corresponding dynamos for supplying the current. On the second floor of the station is an electric crane for handling the batteries, taking them up from the street level for charging, and again lowering them to the first floor to be transferred to the cars. The discharged batteries can be removed from a car, and newly charged ones put in their place within two minutes. The trials thus far have given entire satisfaction.

Bids on the Great Kanawha River Improvement.

New bids were opened in the United States Engineers' office in Charleston, W. Va., last week for the construction of locks and dams Nos. 10 and 11 of the Great Kanawha River improvement, authorized by the last Congress. The bids were as follows: Lock No. 10: Joseph Giamaui, Allegheny City, Pa., $238,555; Zimmerman, Truax & Sheridan, Duluth, Minn., $234,441; Thomas Munford, Lock Seven, W. Va., $241,025; Harold & McDonald, Pittsburgh, Pa., $245,862 (this bid was incomplete). The contract will be awarded to Zimmerman, Traux & Sheridan if their bonds are found satisfactory. Bids for Lock No. 11: Pettitidider & Hogue, Frankfort, Ky., $559,325; Thomas Mumford, Lock Seven, W. Va., $536,895; Harold & McDonald, Pittsburgh, Pa., $559,500; Thomas, Norris & Sheridan, Duluth, Minn., $553,810; Shipman & Stewart, Cincinnati, O., $579,460. Mr. Mumford, of Lock Seven, W. Va., is the lowest bidder and the contract will go to him if his financial status is found to be satisfactory.

Long Distance Power Transmission.

Plans have been prepared for the electric transmission of power from Snoqualmie Falls to the city of Seattle, Wash. The falls, it is estimated, will furnish some 32,000 H. P. at all seasons of the year; the distance to Seattle is 24 miles in an air line, but nearly 40 miles by the most available route for a wire line. Seattle has about 40,000 people and is a manufacturing town, but coal is very cheap, about $1.25 per ton in large lots, and the electric power will have to be furnished at a low rate.—*Engineering and Mining Journal.*

Tire Fractures on German Railways.

In an article on tire fractures on German railroads, in the transactions of the *Verein fur Eisenbahnkunde*, Mr. Bork says that in the seven years from 1884 to 1890 the number of breakages amounted to a little more than one-half of one per cent., so that for every 100 axles there was somewhat more than one broken tire. In 1890 alone 30 trains were derailed in Germany as the direct result of tire fractures. Mr. Bork gives the appended table of tire thicknesses and fracture percentages for each thickness as observed on the German lines:

Tire Thickness in Centimetres.	Fractures, Per Cent.
6	0.025
5 to 6	0.080
4.1 to 5	0.290
3.5 to 4	0.510
3.4 to 3.5	1.050
2.5 to 3	1.650
2 to 2.5	1 850

High Efficiency in Long Transmission of Power by Electricity.

The report of the special commission appointed at the Frankfort exhibition in 1891 for the purpose of determining the efficiency of the electric transmission of power between Laufen, Switzerland and Frankfort-on-the Main shows the loss in power transmitted by electricity over a distance of 108.5 miles. The water power at Laufen is utilized by a turbine wheel, and 300 H. P. in current is sent over the line to Frankfort-on-the-Main, and is there used for lighting. It is found in the investigations that the efficiency in the dynamos is 90 per cent., while the efficiency of the transformers was 95 per cent. for the first and 95 4 per cent. for the second. The efficiency of the line between the dynamo and lamps was 81 per cent., while that from the turbine shaft to the lamps was 73.3 per cent. The weight of the dynamo, which is rated at 127½ E. H. P., is 25 6 tons.

The Edgar Car Lubricator Packing.

The new form of journal packing known as the Edgar car lubricator packing, which was described and illustrated in the *Railroad Gazette* of March 24, seems to have met with success in trials made with it. Indorsements from some of the master mechanics of the Pennsylvania Railroad, who have given it a trial, are very favorable. One of them made a test of this packing on a train of passenger cars running between Sunbury and Shamokin. Several journals of the cars in this train were supplied with the Edgar packing and the others were lubricated in the usual manner. At the first oiling, at the beginning of the test, each journal was supplied with 1½ quarts of oil. The train ran 4,500 miles in 28 days, and during that time the journals which were supplied with the Edgar waste ball packing gave no trouble whatever and received no oil during the period of the test; the journals that were lubricated in the ordinary manner received nearly 5 quarts of oil each. At the end of the 4,500 miles the waste balls were in good condition, and undoubtedly would have lubricated the journal for several hundred miles more. The results of this test

were considered sufficiently satisfactory to warrant a more extensive trial, and arrangements are now being made to give such a trial. On the Philadelphia & Reading also very good results have been secured with this packing. One car ran continuously for 83 days without being repacked or having any fresh oil. During that time it made 9,997 miles. The master mechanic, who gives us this information, says that the performance of this lubricator seems to him to be most wonderful, and its record surpasses anything of the kind that has ever come under his observation.

Tempering Locomotive Spring Steel.

A correspondent advises us that it is a general practice in railroad shops to heat locomotive spring steel quite hot for fitting, and then to harden from the same heat after the steel has cooled down considerably. He asks: 1. "Do you consider this good practice?" 2. "Is there any perceptible gain in letting the steel cool down and then taking another heat on it to harden?" 3. "Will the steel refine at the refining heat when it has arrived at that heat by cooling down from a scaling heat?" 4. "Is there enough advantage to warrant the trouble in letting the leaves cool down after fitting and then taking a separate heat to harden?" We answer: 1. This is one of the worst practices; if the steel does not crack it is mighty good steel, but it is strained badly even if it does not crack. 2. There is a decided gain in letting a forged piece get cold and then reheating to the refining heat. 3. The steel will not refine; it will be fiery and coarser than the refined grain. 4. Most decidedly there is enough advantage in taking a separate, careful heat for hardening to pay for the trouble and expense; there is all the difference between danger and safety; bad grain and good grain; cracked steel and sound steel.—*Sparks from the Crescent Anvil.*

Electric Car Lighting.

Electric car lighting trials have recently been made on the railroad between Berlin and Hamburg, Germany. Each compartment of the cars experimented with was lighted by two incandescent lamps of from 8 to 10 candle power, the lamps in some cases being placed in the middle of the compartments, and in others, one on each side The current for each car was furnished by two storage batteries of 18 cells each, placed underneath the car floor. The intensity of the light was under the control of the passengers by means of a resistance box. Nothing is said of the outcome of the trials.

Lignomur for Head Linings.

Mr. Charles E. Copp, Master Car Painter of the Boston & Maine, in an article on passenger car head linings, gives the following description of Lignomur, made by the American Decorative Co., of Boston, as a passenger car head lining:

Lignomur is a thick material with a raised or embossed figure which can be obtained in the white and finished by yourself, or, what is better, a mahogany colored ground printed into it, leaving the white raised figure. The manner of applying this is as follows: Thin, narrow matched sheathing is used as a ceiling, which, after being nailed up, is glue-sized and then the Lignomur is laid upon this by using a strong glue and well rubbed down with cloths. Various patterns of this material are made, and if laid out with some ingenuity of design, using two or three patterns, and covering the joints of the various panels with thin mahogany beaded moldings, with blocks at the corners with rosettes turned on them, a very pleasing car ceiling may be produced. It certainly is highly ornamental and may, in various ways of finishing with different bronzes on diversified grounds, be made very elegant.

Mr. Adams, Master Car Builder of the Boston & Albany, has used this material entirely for some three years and has about 30 cars in which it is used. He is much pleased with it and says: "I have had a good many of these cars in shop for cleaning and varnishing, and I find the head lining as firmly fastened and as secure as when first put up. It washes off as well as a piece of solid wood and looks as well as new when thoroughly cleaned. The first cost is much less than veneered panels and the appearance more cheerful."

The Columbian Intramural Railway.

The line of this company at Jackson Park was formally opened on Thursday, April 28, with a trip over the road of a train consisting of one metor car and four trailers, and carrying a party of about 150 invited guests who were assembled at the Fifty-seventh Street Station. The start was somewhat delayed by an accident to the switchboard in the morning, but repairs were made in time to avoid a postponement of the exhibition. Considering the fact that this was the first train run over the road, the trial may be fairly called successful, though the trip was not made without a number of short delays, caused chiefly by insufficient clearance at station platforms. No defects in the construction of road or equipment were developed, the single motor car handling its train of four trailers with apparent ease on the numerous grades and short curves of the road.

THE SCRAP HEAP.

Notes.

The Grand Trunk has given out that no passes will be issued "during the World's Fair."

The Missouri Pacific is pursuing a policy of severe retrenchment at numerous points on its lines.

A local paper states that the Missouri, Kansas & Texas has just discontinued the use of speed indicators on its freight trains.

Caterpillars on the track made their first appearance this season at Clarkton, N. C., where, according to the engineer, they were 2 in. deep for 10 miles.

The Supreme Court of Kansas has decided the dispute about the railroad commissionership, removing Commissioner Mitchell. It is said that this gives the control of the Board to the populist party.

The Meigs elevated railroad, a short section of which was built at Cambridge, Mass., eight years ago, and which has been standing unused ever since, was put in order last week and several trips made with the engine and two cars.

Governor Flower, of New York, has signed the bills passed by the late legislature requiring automatic couplers and air brakes on freight trains. The provisions of the bills are, we believe, substantially the same as those of the Congressional law, except that passenger cars are not included.

An automatic switch closer, invented by T. S. Mitchell was exhibited at Pittsburgh last week. A shoe attached to the locomotive strikes an iron bar 12 ft. before reaching the switch, and if the switch is not set for the main track, this bar, being moved by the shoe, at once straightens it.

The case of Engineer James Lennon who was adjudged guilty of contempt of court in the Ann Arbor case, has been presented to the Supreme Court at Washington, but it is said that no decision will be reached before October. The case goes to Washington on an application for a writ of habeas corpus.

The Bureau of Statistics of the State Department, hereafter to be known as the Bureau of Consular Reports, will soon have in the press of the Government Printing Office reports from consuls on the railroads of Uruguay, of Paraguay, Venezuela, Colombia, British Honduras, and of the Rio Grande Do Sul; and a briefer one on the reports of Mexico.

It is said that the Richmond & Danville has spent $100,000 in compromising the lawsuits of persons injured at the Statesville (N. C.) wreck in 1891. This derailment, killing 22 persons, was due to malicious loosening of a rail, and the company disclaimed liability, but its officers appear to have deemed it best to compromise numerous suits, nevertheless.

Eugene V. Debs, prominent in the Firemen's Brotherhood, is endeavoring to establish the "American Rail road Union," to be a non-secret organization of various classes of railroad men, without an insurance branch. He says that he has already secured considerable cooperation, and he is getting a large amount of free advertising on account of the controversies arising out of the attempt of the old brotherhood to expel him.

The United States Department of Labor is engaged on an elaborate report of building loan associations. It has been estimated that there have been 5,000 of these formed in the United States, and the capital involved is probably several hundred millions. They are not the work of bankers, but of the "ordinary fellow," and their successful conduct, with few or no failures, illustrates the ability of every-day Americans to carry on their own business. The affairs of about two thousand of these associations have already been investigated, but the report will not be published for a year.

World's Fair Notes.

The Ferracute Machine Co., of Bridgeton, N. J., has recently shipped two full carloads of machinery for its exhibit at the Columbian Exposition. This machinery consists of 12 power presses, the largest weighing about 12,000 lbs., spinning lathes, polishing machinery, several smaller machines for beading, trimming, threading, etc., and about 40 pairs of dies. The company has made a contract with the Pittsburgh Reduction Co. to manufacture all the articles from thin metal which are made in sheet aluminum in the Exposition grounds.

Lake Notes.

A new steamer, the Selwyn Eddy, a "straightback," has brought 149,820 bushels of wheat into Buffalo, breaking all previous records for large wheat cargo, on her maiden trip.

A new passenger service was inaugurated on April 26, or an old one revived, by starting a line of night boats between Cleveland and Buffalo. The time of the first trips has been between 11 and 12 hours, but it is expected to be reduced to between 10 and 11 hours.

The storm of April 19 and 20 was the most disastrous of any April storm remembered. A loss of $350,000, on which $260,000 of insurance was placed, is reported, and a great deal of wet grain is coming to port. It is very fortunate, considering the velocity of the wind, that so few boats were out.

Everything is now completed at Conneaut harbor for the reception of ore in large quantities. The channel is dredged to a depth of 17 ft. through its entire length, and the west pier has been repaired and extended 200 ft. out into the lake. Thirteen Brown hoists are now ready for business at this harbor, and it is expected that a large amount of iron ore will be received there this season.

Navigation on Lake Superior opened on April 29. It is not expected, however, that Duluth harbor will open until May 15, as there are about 30 miles of ice in front of Minnesota Point. Some of the papers are talking of July 4, the latest date for opening known, but a few days of northwest wind would clear the ice away. s soon as the harbor opens the great World's Fair whaleback steamer "Columbian" will start for Chicago and the McDougal yard will launch three vessels. Navigation to all points on Georgian Bay was opened on April 28.

The condition of the freight market is depressing to the marine interests. The disagreement as to price between the ore miners and ore users results in few ore charters; the lake docks are bare of coal, while the wheat corner in Chicago, combined with the late opening of the canals, has reduced the rate on wheat from Chicago to Buffalo to one cent, and two large cargoes of oats were placed at Chicago for ⅞ cent a bushel. Superintendent Hannan states that the Western division of the Erie Canal and the Champlain Canal will open for navigation on May 3. The Eastern and Middle divisions of the Erie Canal, the Oswego, Cayuga and Seneca canals, and that portion of the Black River Canal between Boonville and Rome will be open for navigationon May 5.

Foreign Railroad Notes.

A railroad museum has been opened to the public at Vienna, being located in the general administration building of the Austrian state railroads. It is hoped that in time it will be enlarged, so as to illustrate the development of the Austrian railroad system from its earliest stages. The museum already contains exhibits of roadbed and track construction, telegraph and signal service, general electric equipment, rolling stock, shop equipment, etc.

Holland's railroad system, according to the *Annales des Travaux Publics*, is controlled by four separate companies, and comprises 4,724 kilometres, or about 2,934 miles of road. The equipment, in 1891, was made up of 715 locomotives, 1,833 passenger cars, and 9,860 freight, baggage and cattle cars. There were carried in that year 22,185,182 passengers and 8,397,342 tons of freight. The street railroad companies numbered 47, operating altogether 962 kilometres, or about 597 miles of road. Thirteen of these companies employed animal traction, 28 used steam locomotives, 5 used both animal and steam traction, and one company used both animal and electric traction. On these lines, it appears, both passengers and freight are carried, the total number of passengers for the year 1891 having been 37.171,352, and the freight having amounted to 244,466,352 tons.

On the East Coast express route between England and Scotland, worked by the Great Northern, North-Eastern, and North British companies, the running of second-class carriages between stations in England and stations in Scotland was discontinued on May 1. The London & North-Western and Caledonian companies also cease to run second-class carriages on the Scotch trains. It is also announced that the three large Scotch railroads, the Caledonian, the North British, and the Glasgow & South- estern will on June 1 make their tickets interchangeable to the principal points on the West Coast, so that passengers can have choice of routes, and that the important trains will depart from and arrive at Glasgow at more convenient hours, instead of starting and coming in at about the same time on all three roads.

Floods in the Mississippi Valley.

High water began to be reported in the valleys of the Mississippi and the Missouri on May 1, and on the following day there was considerable damage reported at East St. Louis and for some distance up and down the river. The track of the Chicago, Burlington & Quincy was much damaged at Altonwood. The St. Louis, Keokuk & Western was submerged and the Bluff line had many washouts. The St. Louis, Iron Mountain & Southern had many washouts in Southern Missouri and Northern Arkansas. The St. Louis & San Francisco suffered in the same way. The usual reports come from Little Rock, Fort Smith and Van Buren, Ark. The Baltimore & Ohio tracks were submerged at Zanesville, O. A dispatch from Paris, Tex., April 30, reported a severe storm with cloud bursts, badly damaging the track of the St. Louis & San Francisco for a distance of 35 miles.

Trains Running on the Elizabeth Elevated.

All east bound trains are now running regularly over the elevated structure at Elizabeth, N. J. The first passenger train went through the Elizabeth station on April 24. The west bound trains still run on grade, but it is expected that by Monday next the second track on the elevated road will be completed, and all trains will then run over the new structure. With the abandonment of the east bound grade track, the foundation of the crossing bridge over the Central of New Jersey tracks, at Broad street, is being extended, and the girders will be in place, and the floor beams and track laid in a few days. As soon as all trains are running over the elevated structure the company proposes to start work on the depression of the Broad street-Morris avenue crossing.

"Your Baggage to the World's Fair."

The above is the title of a placard issued by General Passenger Agent De Haven, of the Chicago & West Michigan, in which he sets forth the usual advice to passengers on the care of their baggage when traveling where crowds are very large. Mr. De Haven's circular, however, is an improvement on the average document of this kind, as will be seen by the following sample of his method condensing. We quote the first five paragraphs of his notice:

Don't take any.
Use satchels, and carry them.
If you must take some baggage, plainly mark with your name and home address in full.
Check it yourself.
Don't allow any one else to do it.

Railroad Accidents in England in 1892.

The Board of Trade Return of Accidents and Casualties on the railroads of Great Britain and Ireland for the last calendar year has just been issued. The number of passengers killed by train accidents was 21, much larger than in 1891; but the number of employés in this class, nine, was even smaller than in the preceding year. The total number of persons killed and injured, both by train accidents and otherwise, is shown in the following tabular statement:

	1892.		1891.	
Passengers:	Killed.	Inj'd.	Killed.	Inj'd.
From accidents to trains, rolling stock, permanent way, etc.....	21	601	5	875
By accidents from other causes...	108	747	98	737
Servants of companies or contractors:				
From accidents to trains, rolling stock, permanent way, etc	9	92	12	154
By accidents from other causes...	525	2,823	537	3,007
Persons passing over railways at level crossings.....	77	21	66	31
Trespassers (including suicides)....	347	121	393	161
Other persons not coming in above classification.....	43	80	57	95
Total..... 1,130		4,485	1,168	5,060

The report also gives the number of passengers killed in or around stations, employés injured at freight houses, etc., which makes an addition to the above of 74 killed and 5,991 injured, thus bringing the total number of casualties reported to the Board of Trade by railroads, 1,204 killed and 10,476 injured.

The annual report contains 210 pages of special reports of inspecting officers concerning certain train accidents which have been investigated. There are 35 of these reports, the list apparently including all the more important accidents since April 1.

Rapid Transit for Boston.

The Rapid Transit Legislative Committee has reported a bill for rapid transit for the city of Boston. The most important change makes the use of New avenue as a highway permissible instead of mandatory. The plan proposes an elevated railroad across the centre of the city from Causeway street to Roxbury. The same commit-

tee has reported a bill for a subway commission of three, with authority to construct in Boston a subway, wide enough for four tracks, from the corner of Tremont and Pleasant streets to Scollay Square, under Tremont street and adjacent land, and the city of Boston is authorized to borrow $2,000,000 for the same.

LOCOMOTIVE BUILDING.

The Cincinnati, New Orleans & Texas Pacific has ordered two consolidation, one six-wheel switching, one eight-wheel passenger and four mogul engines from the Baldwin Locomotive Works.

The order of the Illinois Central was given out last week and divided between the Brooks Locomotive Works and the Rogers Locomotive Works. Thirty-three engines were ordered from the Rogers Works and 15 from the Brooks.

The Baldwin Locomotive Works has received an order from the Seaboard Air Line for building six 10-wheel and two six-wheel switching engines. The Richmond Locomotive & Machine Works has a contract for building six 10-wheel engines instead of 12, as reported in our issue of April 21.

The Rogers Locomotive Works have received an order for eight switching engines for export to Chili. The locomotives have six drivers, coupled; cylinders, 13 × 22 in.; drivers, 48 in.; boilers, 44 in.; gauge of road, 5½ ft. These are all tank engines for the Chilian Government Railroad. Eight years ago the Rogers Works built one, and the present order is for engines to duplicate that one precisely.

The Baldwin Locomotive works have recently contracted with the Missouri, Kansas & Texas for 10 locomotives of the Vauclain compound system, of which nine are 10-wheel locomotives with cylinders 14 in. and 24 in. diameter by 24 in. stroke and 68 in. driving-wheels, and one consolidation freight locomotive with cylinders of the same respective diameters, but with 26 in. stroke, and driving-wheels 56 in. diameter.

The Baldwin Locomotive Works has delivered to the Baltimore & Ohio a large number of engines of the order placed last December. The order was for 101 locomotives, and comprises 14, 20×24 cylinder passenger locomotives with 68-in. driving wheels; 2 passenger locomotives with 78-in. driving wheels, one of which has single expansion cylinders 20×24 in., the other Vauclain compound cylinders 13½ in. and 22 in. diameter by 24 in. stroke. These two engines are for exhibition at the World's Fair at Chicago; 20, 21×26 cylinder consolidation locomotives; 35, 20×26 cylinder 10-wheel locomotives; 10, 19×24 cylinder passenger locomotives, five with 72-in. driving wheels, and five with 68-in. driving wheels; 15, 19×24 cylinder 6-wheeled switchers, and five, 14×24 cylinder 4-wheeled switching engines. Delivery was begun Feb. 28, with four of the 68-in. wheel passenger locomotives, and a number of the consolidations have since been delivered. In addition to the two passenger locomotives, Nos. 858 and 859, above mentioned, there will be shown in the Baltimore & Ohio exhibit at the World's Fair one 10-wheeled locomotive, No. 1,342, and one passenger locomotive with 72-in. driving wheels, No. 887.

CAR BUILDING.

The Norfolk & Western has ordered from the Roanoke Machine Works 35 cabin cars and two wrecking cars.

The Receivers of the Philadelphia & Reading Railroad filed an application last week for authority to purchase 2,500 coal cars.

The International & Great Northern has just built at its shops at Palestine, Tex., the first two cars of an order for 13 that are building at these shops.

The Canadian Pacific has just completed a sleeping car at its car shops at Montreal, which is said to have cost $30,000. The car is named Bombay, and is finished outside in Honduras mahogany. It has 12 sections, the interior woodwork being of carved white mahogany and the seats covered with plush of a sage green color, the whole style being that of the Spanish Renaissance. There are toilet rooms for ladies and gentlemen, a complete bath room, a smoking room and a stateroom. The latter is completely shut off from the rest of the car. The car is fitted for electric light.

BRIDGE BUILDING.

Akron, Ia.—The County Supervisors have let the contract for rebuilding the bridge across the Big Sioux River at Akron to the King Bridge Company, of Des Moines.

Baltimore, Md.—The Lexington street bridge over Jones' Falls has been finished and accepted from the contractor. The bridge is a deck girder, carrying the street across the Falls. There are fourteen girders. The bridge is 70 ft. wide and 78 ft. long. It was built by the Campbell-Zell Co., of Baltimore. The cost was $26,381.

Cumberland, Md.—The Baltimore & Cumberland Railroad has made application to the Board of Public Works to build a bridge over the Potomac River at this place. This bridge will be the longest one on the proposed road.

East Liverpool, O.—The East Liverpool Bridge Co., the incorporation of which was noted in last week's *Railroad Gazette*, proposes to build a highway bridge over the Ohio River at East Liverpool. The corporation referred to is merely nominal, but it is said that the project has the support of ample capital. E. R. Curtis, of Luray, Va., represents this capital and is now in East Liverpool making surveys and preparing plans for submission to the War Department. The bridge is expected to cost about $500,000 and will be the only highway bridge between Pittsburgh, Pa., and Wheeling, W. Va.

Great Northern.—The Edge Moor Bridge Works has completed the erection of the bridge across the Columbia River at Rock Island, Wash.; also of the bridges at Coon Creek and Rice Creek, Minn. The same company has begun the erection of the superstructure of the Third street and Main street bridges at Minneapolis.

Newcomerstown, O.—The contract for a new steel bridge to span the Tuscarawas River to carry the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad, to replace one washed away in a flood several months ago, has been let. The plans for the new structure provide for a three-span, double-track bridge, with overhead work. The erection work will be under the supervision of Mr. William Priest, one of the company's engineers. It is possible that difficulty will be encountered in securing a foundation for the piers, as the river bed at this point is uncertain.

Peterboro, Ont.—The Central Bridge & Engineering Co. is very busy at present. Orders for bridges have recently been received from the Canadian Pacific for seven spans of various lengths to be placed at different points on its lines, replacing temporary structures; also from Manitoba for two spans over Shell River at Asessippi, Man., and from Paisley, Ont., in the west for a bridge 200 ft. long; for one at Thamesford, Ont., near Woodstock, Ont.; one at Rainham, Ont.; one at Florence, Ont., and one at Drumquin, Ont., near Oakville, Ont. Bridges at the following places have lately been built and erected by the company: Ottawa, Bracebridge, Galt, St. Mary's, Bocaygeon, Richmond, Port Elgin, and Cooksville, all in Ontario. A swing railroad bridge for Gananoque is now being completed.

Philadelphia.—Plans are now under consideration by the officers of the Pennsylvania Railroad for the widening of the bridge over the Schuylkill River at Filbert street. The bridge at the present time is only wide enough for three tracks, and it is proposed to make it large enough to accommodate six tracks.

Sioux City, Ia.—Sooysmith & Co., of New York City, sub-contractors, under the Phœnix Bridge Company, for the Pacific Short Line bridge, last week filed a mechanic's lien on the property for $93,000. Sooysmith & Co. accepted the contract to build the sub-structure for the bridge on July 22, 1890, and continued work until Dec. 22, 1890. The firm resumed work on the piers this spring, their claim for work done in 1890 having been settled. Their claim for work done this year are $167,550, on which there is an unpaid balance of $93,000.

Spokane, Wash.—The Board of Public Works has awarded the contract for building the Olive street bridge to the Toledo Bridge Company at its bid, of $21.710. The bridge will have three steel spans and tubular piers resting on pile foundations. The other bidders for the bridgework were the Western Bridge Company, San Franscisco Bridge Company, Bullen Bridge Company of Pueblo, King Bridge Company, Pacific Bridge Company and California Bridge Company.

Winnipeg, Man.—Work on the Norwood bridge has been stopped for the present, and will not be resumed until June 10 On that date work on the superstructure will be started.

Woonsocket, R. I.—The Hamlet avenue bridge question, which has been a matter for discussion for over a year, will probably be decided at the special election on May 22, the General Assembly of Rhode Island having granted authority for a special election. The City Council has fixed the date for May 22, when the location for the bridge will be decided by a vote of the taxpayers.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Baltimore & Ohio, semi-annual, 2½ per cent. on the common stock, payable May 17.

Chicago & Alton, quarterly, $2 per share on the common and preferred stock, payable June 1.

Denver & Rio Grande, 1 per cent. on the preferred stock, payable May 15.

Lake Erie & Western, quarterly, 1¼ per cent. on the preferred stock, payable May 15.

Pennsylvania, semi-annual, 2½ per cent., and 2 per cent., in scrip, payable May 31.

Pullman's Palace Car, quarterly, $2, payable May 15.

Rome, Watertown & Ogdensburg, quarterly, 1¼ per cent., payable May 15.

Wheeling & Lake Erie, quarterly, 1 per cent. on the preferred stock, payable May 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Ashland, annual, Hudson, Wis., May 20.

Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 23.

Canadian Pacific, special, Montreal, Que., May 10.

Cedar Falls & Northern, annual, Hudson, Wis., May 20.

Central of New Jersey, annual, Jersey City, N. J., May 5.

Chesapeake & Ohio Southwestern, special, Memphis, Tenn., June 13, to approve of the purchase of the Hodgeneville & Elizabethtown.

Chicago Burlington & Quincy, annual, Chicago, May 17.

Chicago & Northwestern, annual, Chicago, Ill., June 1.

Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 3.

Cleveland, Cincinnati, Chicago & St. Louis, special, Cincinnati, O., May 10.

Compton Heights, Union Depot & Merchants' Terminal, annual, St. Louis, Mo., May 31.

Delaware & Hudson Canal, annual, New York City, May 9.

Delaware & New England, annual, Wilmington, Del., May 15.

Des Moines & Fort Dodge, annual, Des Moines, Ia., June 1.

Eau Claire, annual, Hudson, Wis., May 20.

Flint & Pere Marquette, annual, Saginaw, Mich., May 17.

Menominee, annual, Hudson, Wis., May 20.

Milwaukee, Lake Shore & Western, annual, Milwaukee, Wis., June 2.

Missouri, Kansas & Texas, annual, Parsons, Kan., May 17.

Mobile & Ohio, special, Mobile, Ala., May 29.

Nealsville & Northeastern, annual, Hudson, Wis., May 20.

New York & Harlem, annual, New York City, May 16.

Omaha & St. Louis, annual, Stanberry, Mo., May 16.

Peoria, Decatur & Evansville, special, Peoria, Ill., June 30.

Pittsburgh, Fort Wayne & Chicago, annual, Pittsburgh, Pa., May 17.

St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 5.

Sault Ste. Marie & Southwestern, annual, Hudson, Wis., May 20.

Superior Short Line, annual, Hudson, Wis., May 20.

Wyoming & Utah, annual, 28 School street, Boston, Mass., May 11.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *International Association of Car Accountants* will hold its next annual convention at Indianapolis, June 19.

The *Master Mechanics' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 19.

The *Master Car Builders' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 13.

The *Association of American Railway Accounting Officers* will hold its fifth annual meeting at the Auditorium Hotel, Chicago, commencing May 31.

The *Railway Agents' Association of North America* will meet at Old Point Comfort, Va., on Tuesday, May 16.

The *Western Railway Club* meets at the rooms of the Central Traffic Association in the Rookery Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7.30 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month except during June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The *Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p.m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The Association of Engineers of Virginia holds informal meetings the third Wednesday of each month, from Septemcer to May inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held on Wednesday evening, May 3, a paper on "The Improvement of James River, Va.," by H. D. Whitcomb, member of the Society, was read and briefly discussed by Messrs. Brush, Brinckerhoff, Bogart, Croes, Collingwood, Gosling, Hutton and Washburn. The following persons were declared elected: As members: Ira Osborn Baker, Champion, Ill.; Charles Kimball Bannister, Ogden, Utah; David Walker Lum, Knoxville, Tenn.; Vsevolod Evguenievitch Timonoff, St. Petersburg, Russia. As associate members: Anson Wood Burchard, Danbury, Conn.; Ernest Grey Freeman, Alton, Ill.; John Venable Hanna, Holly Springs, Miss.; Edwin Allston Hill, Cincinnati, O.; Richard Haden Hood, Columbia, Mo.; Henry Brigham Looker, Washington, D. C.; Alfred Milton Mosscrop, Rochester, N. Y.; Morris Robeson Sherrard, Sandy Hill, N. Y.; Erasmus Darwin Wileman, Toledo, O. As juniors: Howard Carter Baird, Phœnixville, Pa.; William Herschel Bloss, Prescott, Ariz.; George Lewis Christy, Chicago, Ill.; Harry Harwood Rousseau, Brooklyn, N. Y.; Abraham Bernard Samuelson, New York City.

Canadian Society of Civil Engineers.

A meeting was held at the society's rooms, Montreal, on Thursday, May 4. A paper on the "Quebec Landslide of 1889" was read by Mr. Chas. Baillairge. The discussion on Mr. J. S. Armstrong's paper on "Transition Curves" was continued.

Engineers' Club of Cincinnati.

At the last regular meeting of the Club there was an attendance of 13 members; five new members were elected. Mr. E. F. Layman read a paper on "Sidewalk Improvements in the Vicinity of Cincinnati," which comprised a review of the legislation enacted by the State of Ohio in the last few years pertaining to the construction of and manner of payment for sidewalk improvements, and a description of the proper construction, workmanship and materials necessary to secure the best results in building artificial stone sidewalks, which have been very generally adopted in the suburbs, an expenditure of $400,000 having been made on them in a few years.

Engineering Association of the South.

The regular monthly meeting of the Association was held in Nashville, Tenn., April 13, with a good attendance, Vice-President T. Magruder presiding. The feature of the evening was a discussion on "High Duty Attachments for Non-rotative Pumping Engines," introduced by Mr. L. d'Auria. The next meeting will be held

at the Cumberland Publishing House Building, Nashville, on May 16.

New England Railroad Club.

The regular meeting of the Club will be held at the United States Hotel, Boston, Wednesday, May 10, at 7 30 p. m. Subject for discussion: "The Desirability of having Standard Trucks and Foundation Brake Rigging for Freight Cars, and the Influence this would have on Repairs."

PERSONAL.

—Mr. R. W. Andrews resigned as General Passenger Agent of the San Antonio & Aransas Pass road this week.

—Mr. John H. Amend, lately in charge of the switch and signal tower at the Union station in Pittsburgh, has charge of the principal tower at the railroad terminus in the World's Fair grounds at Chicago.

—Mr. F. L. Pomeroy, late General Freight Agent of the New York, Lake Erie & Western, has been appointed manager of R. F. Downing & Co.'s transportation department, with office at 20 Exchange Place, New York City.

—Mr. H. L. Gantt, late of the Midvale Steel Company, has been appointed General Superintendent of the American Steel Wheel Company, vice Mr. George W. Cushing, resigned. Mr. Gantt will have charge of the new plant at Garwood, N. J.

—Mr. Joseph S. Harris assumed the office of President of the Philadelphia & Reading Railroad and Coal and Iron companies on May 1. He was appointed Receiver of the companies on the same day upon the petition of Receivers Paxson and Wilbur, Mr. McLeod having previously resigned as Receiver.

—President Cleveland has nominated the following to be Government directors of the Union Pacific Railway Company, to serve for the ensuing four years: Henry F. Dimock, of New York; Don M. Dickinson, of Michigan; J. W. Doane, of Illinois: Gen. Fitz Hugh Lee, of Virginia; Joseph W. Paddock, of Nebraska.

—Mr. H. W. Hammond, Superintendent of the Western Division of the New York & New England, resigned on May 1. Mr. Hammond was for a number of years connected with the Rome, Watertown & Ogdensburg, and he was appointed Division Superintendent of the New York & New England by President Parsons last February.

—Mr. Floyd H. White, Secretary and Treasurer of the American Dredging Co., died in Philadelphia, April 29. He was formerly Secretary and Treasurer of the Camden & Amboy road, and when it passed under the control of the Pennsylvania he became Assistant Secretary of the latter company. He resigned in 1877 to become Secretary of the American Dredging Co.

—Mr. John Russell Young resigned the office of Fifth Vice-President of the Philadelphia & Reading Railroad on May 1. Mr. Young has been in charge of the press bureau of the railroad since last July, when the office of Third Vice-President was created by President McLeod to take charge of this department, and Mr. Young appointed to the position. His title was changed soon after the Lehigh Valley leases, when some of the officers of that company were appointed Vice-Presidents of the Philadelphia & Reading.

—Mr. James Dredge, editor of *Engineering*, was the guest of the Western Society of Engineers, at a dinner in Chicago on Wednesday evening. Mr. R. W. Hunt, President of the Club, was in the chair, and besides members of the Club many prominent engineers were present. On Monday Mr. Dredge, who is one of the Royal Commissioners, invited many of his friends to luncheon at the Victoria House on the Fair grounds. This courtesy did a good deal to lighten the fatigues of that most interesting but somewhat trying day.

—A cablegram from London, Eng., announces that the council of the Iron and Steel Institute of Great Britain, has awarded the Beseemer gold medal to Mr. John Fritz, General Superintendent and Consulting Engineer of the Bethlehem Iron Company. The Bessemer medal, as is well known to most of our readers, is given each year by Sir Henry Bessemer for distinguished services in the iron and steel trade. Hon. Abram S. Hewitt received a Bessemer medal in 1890, when the Iron and Steel Institute held a meeting in this country. The late Alexander L. Holly, of New York, is the only other American who has received this medal.

—Mr. Frank Ellmaker, who succeeds Col. O. E. McClellan as Superintendent of the middle division of the Pennsylvania, entered the service of the Pennsylvania in 1880 as Assistant Engineer in Altoona, serving until 1881, when he was appointed Assistant Supervisor on the Philadelphia Division; in 1882 he was appointed Assistant Engineer of the Monongahela Division; in 1883 Assistant Engineer of the New York Division; 1886 Superintendent of Belvidere Division; 1889, Superintendent of the Sunbury and Shamokin divisions; 1891, Superintendent of the Amboy Division, and in January, 1893, Superintendent Delaware Extension and Kensington Division. Mr. R. M. Patterson, promoted to be Superintendent of the Delaware Extension and Kensington Division, succeeding Mr. Ellmaker, began his career as a civil engineer on the Columbia & Port Deposit road. He was afterward Assistant Supervisor of the Philadelphia & Erie Division. He then became Secretary and Engineer of the Altoona Coal & Railroad Co. of Virginia; then Resident Engineer in charge of the construction of the new River Division of the Norfolk & Western Railroad. His next position was as Superintendent of the Rochester Division of the Buffalo, New York & Philadelphia, and later he was General Superintendent of the Lackawanna & Pittsburgh road. Since 1885 he has been connected with the office of transportation department of the Pennsylvania Railroad in the discharge of special duties.

ELECTIONS AND APPOINTMENTS.

Adirondack & St. Lawrence.—This road is now operated as a part of the Mohawk division of the New York Central & Hudson River, and beginning May 1 was included in the jurisdiction of F. A. Harrington, Superintendent of the Mohawk division. Sidney Colton, Trainmaster of the Mohawk division, has been appointed Assistant Superintendent of the division with headquarters at Utica, N. Y.

Allegheny Valley—The annual meeting was held at Pittsburgh, May 1. The following officers were elected: President, W. H. Barnes; Directors, George B. Roberts, John P. Green, Henry D. Welsh, P. A. B. Widener, Samuel Rae and John B. Jackson. The only change in the directory is that Samuel Rae takes the place of R. D. Barclay.

Augusta Southern.—The following directors were elected at a meeting in New York City last week: John M. Dennison and F. M. Colston, of Baltimore, Md.; John W. Cochrane, of New York; J. U. Jackson, Moses C. Murphy, P. H. Langdon and George J. Fargo, of Augusta, Ga. Mr. Jackson was chosen President, and W. B. Thomas, General Manager. This company is a reorganization of the Augusta, Gibson & Sandersville road.

British Pacific.—The following were elected directors of this company last week: R. P. Rithet, of Victoria, B. C.; Theodore Lubbe, E. G. Prior, F. S. Barnard, Charles Vernon, E. Crow Baker, W. H. Ellis and Frank Bakeman, the latter of Chicago. This road is a reorganization of the Canada Western.

Buffalo, Rochester & Pittsburgh.—George J. Rose, General Roadmaster, having resigned, he has been succeeded by C. E. Hulbert, with headquarters at Punxsutawney, Pa.

Canadian Pacific.—G. H. Eaton, who has been Car Foreman at Toronto, has been recently promoted to be General Foreman of the shops at Hoclelaga, Que. This appointment was reported incorrectly in our issue of April 21.

Central Ohio.—The following directors were elected at the annual meeting held in Columbus, O., last week: Walter B. Brooks, Joseph W. Jenkins, Joshua G. Harvey, Osmun Latrobe and A. B. Crane, of Baltimore, Md.; David Lee and John Hoge, of Zanesville, O.; James H. Collins and Gilbert C. Hoover, of Columbus, O.; John R. Hall, of Quaker City, O.; C. H. Kibler, of Newark, O.; W. W. Peabody, of Cincinnati, O., and Daniel C. List, of Wheeling, W. Va.

Cleveland, London & Port Stanley.—Frank S. Miller, of Cleveland, O., who became President of this company in January, resigned last week. He has been succeeded by Jerome B. Zerbe, of the Ohio & Pennsylvania Coal Company, of Cleveland, who was largely interested in the company when it was organized, in January, to lease the London & Port Stanley road.

Colorado Midland.—The title of H. Collbran, formerly General Manager, has been changed to General Agent, his headquarters being at Denver, Col. The offices of the Auditor and Treasurer have been removed from Colorado Springs, Col., to Topeka, Kan.; Charles Noble, Treasurer, has resigned, and E. W. Sells, Auditor, will remove to Topeka, Kan. The Colorado Midland will be operated by the general officers of the Atchison system and as a part of a grand division, including all lines west of Dodge City, Kan.

Dry Fork.—The incorporators of this company, chartered in West Virginia in January, met in Baltimore, Md., recently and elected a board of directors, as follows: Martin Lane, of Wilmington, Del.; R. F. Whitmer, of Philadelphia; Levi C. Condon, Albert N. Horner and Frank Woods, of Baltimore. Mr. Whitmer was elected President and Mr. Lane Treasurer.

Duluth, Messabe & Northern.—The appointment of D. M. Philbin, formerly General Superintendent of the Duluth, South Shore & Atlantic, General Manager of this road, previously reported, took effect May 1. G. H. White, Superintendent, has resigned, his resignation taking effect May 1.

Grand Trunk.—O. S. Cockey has been appointed General Agent of the company in New York City, with offices at 291 Broadway.

Gulf, Colorado & Santa Fe.—W. G. Nevins, formerly Supply Agent of the San Antonio & Aransas Pass, has been appointed Purchasing Agent and Assistant to General Manager B. F. Yoakum.

Mexican National.—James Farrell has been appointed Master Mechanic of the Northern & Texas Division, with headquarters at Laredo, Tex. M. J. Schneider has been promoted to the position of Master Mechanic of the San Luis Division, vice James Farrell transferred.

Monterey & Mexican Gulf.—G. L. Filer has been appointed Assistant General Freight and Passenger Agent of this company, with headquarters at Monterey, Mex.

New York Lake Erie & Western.—H. T. Jaeger has been appointed General Agent of the Passenger Department at Buffalo, N. Y. He will have charge of the Buffalo, Rochester, Western and Bradford divisions. A. W. Bodle has been appointed Northwestern Passenger Agent, with headquarters at Detroit, Mich. The position of Canadian Passenger Agent has been abolished.

Ohio & Mississippi.—O. P. McCarty has been appointed Acting General Passenger Agent, vice Gen. W. B. Shattuc, who has resigned to become Passenger Commissioner of the St. Louis lines, and David Agnew has been appointed Acting Auditor, vice E. P. Cutter, resigned. Mr. Agnew has been acting as Mr. Cutter's chief clerk.

At a meeting of directors in New York, R. Suydam Grant was elected a director in the place of A. Gracie King, resigned.

Pennsylvania.—Frank Ellmaker has been appointed Superintendent of the middle division with headquarters at Harrisburgh, vice O. E. McClellan, resigned, and R. M. Patterson has been appointed Superintendent of the Delaware extension and Kensington division, vice Mr. Ellmaker, promoted.

Philadelphia & Erie.—Charles N. Potts has been appointed Master Mechanic of the shops at Erie, Pa., vice Robert K. Reading, transferred to Sunbury, Pa. R. T. Morrow has been appointed Assistant Engineer of the middle division, vice N. F. Hopkinson, transferred.

Phillips & Rangeley.—At the annual meeting of this road held in Portland, Me., last week, the following directors were elected: Arthur Sewall, Frank Jones, J. S. Ricker, Payson Tucker, George M. Goodwin, F. E. Timberlake, W. A. Rich, A. B. Gilman, Calvin Putnam. The officers were re-elected. Payson Tucker is General Manager.

Pittsburgh & Western.—President Henry W. Oliver resigned at the annual meeting held in Allegheny, Pa., May 1, giving as a reason the demands made upon his time by his mining and manufacturing interests. He was elected Chairman of the Executive Committee by the Board of Directors. Gen. Orland Smith, Vice-President, will perform the duties of President. At the annual meeting the following directors were elected: President, Henry W. Oliver, Allegheny, Pa.; Vice-President, Gen. Orland Smith, Baltimore, Md.; Directors, Orland Smith, Henry W. Oliver; James Sloan, Jr., Baltimore, Md.; Edward R. Bacon, New York; John W. Chalfant, A. M. Byers, C. L. Fitzhugh and John McCleave Pittsburgh.

Texas Central.—F. B. Aglar, General Freight and Passenger Agent, resigned last week. W. F. McMillan, Chief Clerk in the Traffic Department, will be his successor.

Union Pacific.—The annual meeting was held in Boston last week; the stockholders elected the following directors: Frederick L. Ames, Edwin F. Atkins, Boston; S. H. H. Clark, Omaha, Neb.; Henry H. Cook, New York, F. Gordon Dexter, Boston; Grenville M. Dodge, George J. Gould, New York; Marvin Hughitt, Chicago, Ill.; Henry B. Hyde, New York; Gardiner M. Lane, Boston; Joseph H. Millard, Omaha, Neb.; Alexander E. Orr, Sidney Dillon Ripley, and Russell Sage, New York; James Sharp, Salt Lake City, Utah. Of the above list, Messrs. Gould and Ripley have been added to the board during the last year. A new office, that of Chairman of the Board of Directors, has been provided for.

The directors re-elected the executive officers and chose Alexander E. Orr, of New York, Chairman of the Board. E. F. Atkins is the First Vice-President and Oliver W. Mink Second Vice-President, Gardiner M. Lane was added to the Finance Committee.

Wichita Falls & Oklahoma.—The following are the incorporators of this company, for which a charter has been filed in Texas: M. Lasker, H. Kempner and Leon H. Blum, of Galveston; H. Richter, of New York; J. A. Kemp, R. M. Moore, M. O'Riley, W. L. Vickers and others, of Wichita Falls, Tex.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Abingdon Coal & Iron.—B. F. Hurt, H. Fugate and Frank Fortune have purchased the graded roadbed of this railroad, from Abingdon to Damascus, Va., 15 miles, for $45,000. It is announced that the grading will now be resumed and the line completed shortly.

Akron & Eastern.—About 11 miles, the heaviest portion of the work on this new road between Akron and New Castle, Pa., 70 miles, have already been built. It is the first section from Akron, O., east. In about two weeks a large force will be put on the construction of another section of 20 miles.

Atlantic & Northwestern.—The contracts have just been let for the extension of this road, operated by the Canadian Pacific, west of Eganville, Ont., toward Parry Sound, but the names of the contractors have not yet been made public. Construction was commenced in August, 1892, at a point connecting with the main line of the Canadian Pacific near Renfrew, and was completed through to Eganville, a distance of 19 miles, Dec. 31. Construction will be commenced again with the opening of season this year in the extension of the line from Eganville west in the direction of Parry Sound, and it is expected to complete at least 50 miles this season. The character of the work to be done generally is not considered heavy in the district to be covered by construction this year, and the bridging is comparatively light. For the first 25 miles the line follows the Bonnechere River, and, commencing in the township of Jones and from there westerly for a distance, runs in close proximity to the Madawaska River. The rivers named are used as the outlet for a most valuable timber district, and in this way the timber will be brought to the railroad.

Atlantic, Suwannee River and Gulf.—A bill was passed by the Florida Legislature last week to charter this road.

Atlantic & Western (Fla.).—The location for a shor branch from Orange City northwest to De Land, Fla., is reported to have been decided upon last week. The work will probably begin shortly, the line being a little over five miles long.

Austin, Bastrop & Colorado Valley Terminal.—A charter for this company was filed in Texas last week. The purpose of the corporation is to construct a road from the city of Austin down the Colorado Valley, on the southwest side of the river, to the town of Bastrop, passing through the counties of Travis and Bastrop, the distance being 35 miles. The directors are: Joseph Burke and John Andrewartha, of Austin; G. W. Jones, H. M. Garwood, Chester Erhard and H. P. Huckett, of Bastrop.

Baltimore & Cumberland.—The final surveys for this line between Hancock, Md., and Sideling Hill have been completed and the engineers are now making the location west of Sideling Hill. The entire line west of Hancock has been surveyed, except a short distance between Sideling Hill and Little Orleans. Three routes have been surveyed through Hancock, but none of them has been selected as yet. The crossing of the Potomac River and Chesapeake & Ohio Canal has been located at North Branch. It will be the only bridge of any consequence on the new line. A good part of the road is ready to be placed under contract, which will be done as soon as possible.

Bellefonte & Mill Hall.—All the necessary funds have been subscribed and engineers are now locating the line through the Nittany Valley, from Bellefonte to Mill Hall. Contracts for the building of the road will be let within the next month, it is said.

British Columbia Roads.—The legislature of this province has voted aid to three railroads for which charters have been granted in the province: The Nicola Valley Co., the Nakusp & Slocan Co. and the Chilliwack Co. The first named company has already been granted aid from the Dominion Government of $80,000 for the construction of 25 miles from near Spence's Bridge toward Nicola Lake, and a further subsidy not exceeding $3,200 a mile on the remainder of its line. The Canadian Pacific has offered to take over these three roads named, when completed, and operate them 25 years for 60 per cent. of the earnings. The British Columbia Government has authorized a guaranty four per cent. interest for 25 years on bonds not to exceed $25,000 a mile on the Nicola Valley and on the Nakusp & Slocan; on the Chilliwack bonds the guaranty proposed is two per cent. on $500,000.

The legislature at its session just closed passed the acts of incorporation for the following companies: The Red Mountain, the Lardeau & Kootenay, the Nakusp & Slocan, the Osoyoos & Okanagan, the Mount Tolmie Park & Cordova Bay, the Kaslo & Slocan Tramway Co., the Kootenay, Lake Shore & Lardo, the Bedlington & West Kootenay, the Nelson & Arrow Lake.

Brooklyn & Brighton Beach.—An amended application was made by President Jourdan to the Brooklyn Board of Aldermen this week for permission to extend the terminus of the road from Atlantic and Franklin avenues to Fulton street, near Franklin avenue, crossing Atlantic avenue and Lefferts Place by an elevated structure. This will connect the Brighton Beach Railroad with the Kings County elevated road in Fulton street.

Caldwell & Northern.—The grading contract for this road was let last week, in Philadelphia, to S. D. Dunavant, of Morganton, N. C., and the work of construction will be begun next week.

Chicago, Rock Island & Pacific.—The grading on the Texas extension south of Bowie has been practically completed as far south as Haslet, about 17 miles north of Fort Worth, Tex. The contracts for this last section have not yet been awarded, because the committee of Fort Worth citizens which has undertaken to secure the right of way for the company have not yet reported. As soon as this matter is settled the grading will be begun and completed without delay into Fort Worth. The officers of the company have announced that no contracts will be let this year for work beyond that town. It is stated that they expect to have through passenger trains running into Fort Worth early in July.

Cleveland, Cincinnati, Chicago & St. Louis.—A press dispatch from Louisville, Ky., has been printed this week which quotes President M. E. Ingalls as announcing that this company has decided to build an extension into Louisville, Ky. Probably the company's plan does not provide for the building of a new line into Louisville. It would require the construction of 50 miles of road to do so, North Vernon, Ind., the town on the system nearest Louisville, being about that many miles distant from the Ohio River. The company may have made a new traffic contract with the Ohio & Mississippi, which has a direct line through North Vernon to New Albany, on the Ohio River.

Cleveland Southwestern.—The organization of this company is reported to build a line from Mallet Creek, the first station north of Medina, on the Cleveland, Lorain & Wheeling, in an almost direct line to Brooklyn, a suburb of Cleveland. The charter of the new line has not yet been filed.

Cross Fork.—Between 400 and 600 men are now working on the grading of this road through Potter County, Pa., and the grading will probably be completed by August next. It is a branch line connecting with the Buffalo & Susquehanna at the head of Cross Fork Creek called Shinglebolt Notch, and extends to the mouth of the Cross Fork, where it empties into Kettle Creek, the distance being 13 miles. The work is let to D. Crage, Cherry Springs, Pa., and Frank Greco, Conrad, Pa., contractors. The bridges are built by D. Vanwigen, of Cowdersport, Pa. C. W. Goodyear is Superintendent, and C. E. Botsford, of Austin, Pa., is Chief Engineer.

Denver, Longmont & Noland.—The Denver, Longmont & Noland Stone & Railway Co. filed articles of incorporation last week. The incorporators are J. M. Dunphy and L. P. Boyle, of Chicago, and Joseph E. Williams, S. A. Williams, L. H. Quimby, G. W. Skinner and E. R. Perkins, of Denver. The company proposes to build a line from Noland, Boulder County, to Longmont, on the survey made by G. B. McFadden in April, 1892.

Fairmont, Morgantown & Pittsburgh.—The indications now are that the opening of this line north of Morgantown, W. Va., will be delayed considerably beyond the time originally contemplated—Aug. 1. Examinations show that the slips which occurred last winter at several points are much worse than was supposed, and that in some places it will be necessary to relocate the line. There will be several miles of road to re-grade. The iron work for several of the bridges has arrived and been placed upon the ground, and the work of erecting will be pushed. The large bridge over Cheat River is progressing finely. Other particulars of the work are given under the title State Line.

Flint & Pere Marquette.—The Michigan State Railroad Commissioners are reported to have approved a map of the location of the proposed extension of this road from Monroe into Toledo, O. The plan filed and approved provides for grade crossings of the Michigan Central and Lake Shore & Michigan Southern tracks. No announcement is made as to when the construction of this line is to be undertaken, and it is doubtful if any active work will be done this year.

Galveston, Sour Lake & Eastern.—W. A. Polk, of Houston, the engineer in charge of building the new road from Sour Lake station, on the line of the Southern Pacific, to Sour Lake, Tex., a distance of nine miles, stated last week that a large force of men is engaged in grading the road and that in all probability rails would be laid in a few days.

Grand Central.—Articles of incorporation were filed at Springfield, Ill., by a company organized under this name. The main line is to extend from Chicago northwesterly to Lake Geneva, Wis. Various branch lines are named in the charter which would connect with about all the suburban towns near Chicago. The incorporators are: William J. Richardson, John V. Farwell, Robert Meadowcraft, C. J. Meadowcraft, F. R. Meadowcraft, William Temple, Frank H. Starkweather, Andrew Petersen and Edmund Knauer, all of Chicago. The directors are: John V. Farwell, Robert Meadowcraft, William Temple, Frank R. Starkweather, Andrew Petersen, Edmund Knauer and W. J. Richardson.

Grand River & Mahoning.—The surveys are now in progress for this road under the direction of the President, James Ritchie, of Cleveland, O. The company was incorporated recently in Ohio to build a road from a point on Lake Erie at the mouth of Grand River, near Fairport, O., through the Grand River, Cuyahoga and Mahoning valleys to the Ohio River near Wheeling, W. Va. The organization of the company is not yet complete. James Ritchie has been elected President and Frank C. Osborn, Secretary and Treasurer. The general office is at 185 Euclid Avenue, Cleveland. The officers state that active work will probably be commenced during the summer.

Green Bay, Winona & St. Paul.—Vice-President Joseph Walker, Jr., stated last week in a newspaper interview that all idea of building the proposed extension to St. Paul this year has been abandoned. He said it would be impossible to build the new road in the present condition of the financial market. No work would be done this year on the proposed southern extensions of the Winona & Southwestern for the same reason.

Holly River Boom & Lumber Co.—This company, which was reported last week as preparing to build a line from the West Virginia & Pittsburgh road, near the Elk River crossing, and extending along Elk River for 17 miles to the mouth of Holly River, has let the contract for the grading to Joseph Fuccy, of Sutton, W. Va. The engineers under James W. Allston are locating the road. The first five miles of the line is located, and grading will commence in a few days.

Independence & Salem.—This company has been incorporated at Salem, Or., having a capitalization of $100,000. The incorporators are J. A. Veness, J. M. Vanduyn, R. D. Cooper, J. M. Stark and Philip Metschan. Ten miles of road will be built this year, starting from Independence, and reaching the Salem Bridge in Polk County. It will be a standard gauge line, with 50-lb. rails.

Kansas City, Pittsburgh & Gulf.—The line to Pittsburgh, Kan., will probably be opened for traffic this week. The new road is an extension from Hume, Mo., and is about 50 miles long, making the present length of the line 129 miles from Kansas City. The Missouri, Kansas & Texas Trust Company, which controls this road, has recently purchased the Kansas City, Fort Smith & Southern, extending from Joplin to Sulphur Springs, Ark., 51 miles, and is now completing the gap of 25 miles between Joplin and Pittsburgh. It also controls the Texarkana & Fort Smith, in operation from Texarkana north to Wilton, Ark., 26 miles, and that road is being slowly extended north toward Fort Smith.

Kaslo & Slocan.—Preparations are being made for the immediate construction of the railroad from Kaslo, B. C., on Kootenai lake, west to the Slocan mines. D. J. Munn, of Victoria, and J. Hendry, of New Westminster, B. C. the projectors of the line state that they have secured a charter from the Dominion Government, and are all ready to commence work on the line. The eastern terminus will be Kaslo, but the western terminus is not definitely decided. The line will touch at some point on Slocan Lake. Several surveys have been made, and the first 20 miles of the road have been definitely located from Kaslo to Bear Lake, at the forks of Carpenter Creek. The entire line will be about 30 miles long. Work will commence on the east 20 miles immediately.

Kingston, Smith's Falls & Ottawa.—The Legislature of Ontario is now considering a bill with respect to this company, providing for the confirmation of the by-laws granting the following bonuses from the towns named: Kingston, $150,000; Smith's Falls, $25,000; South Emsley, $10,000: South Crosby, $10,000; Ottawa, $50,000, and Richmond, $4,000.

Memphis Belt.—An application for a charter for a company of the above name has been made by Amos Woodruff, James G. Henning, J. J. Williams, E. A. Keeling and J. L. Wellford. There is a belt line now in operation at Memphis to connect with the Memphis Bridge, which is called the Union Railway Co.

Missouri, Kansas & Eastern.—The storm last week did considerable damage to this new line along the north bank of the Missouri River, the roadbed being washed away in many places, the most serious damage being done on the western end of the road in Boone County. The roadbed will have to be entirely regraded at a number of places and the track relaid. The damage is estimated at $100,000, and the opening of the line for passenger traffic will be delayed perhaps two months.

Mobile & Birmingham.—The work on the new line into Mobile, Ala., from the junction, 2½ miles north of Mobile, has been begun. The contract for building the new line has been awarded to Mr. Wilson, of Macon, Ga. The work will be completed by July 1. The new route is through the Three-mile Creek swamp, and east of the Mobile & Ohio track, crossing that road at Three-mile Creek a few hundred yards below the Mobile & Ohio bridge.

Mobile & West Alabama.—The railroad surveyed by the state of Alabama, and designed to connect the port of Mobile with the Warrior coal fields at Tuscaloosa, and to proceed thence to Florence, on the Tennessee River, has been organized as the Mobile & West Alabama Company. Col. John T. Milner, of Birmingham, Ala., the builder of the South & North Railroad of Alabama, has been elected President, Judge W. J. Wood, of Nashville, Tenn., lately Third Vice-President of the Louisville & Nashville, has been elected Vice-President; J. H. Tindall, of Mobile, Treasurer, and George B. McKnight, of Mobile, Secretary.

Myrtle Springs.—Work was begun last week on this road to be built from Myrtle Springs to Willis Point, Tex., 10 miles. It is thought that the road will be completed and in operation by July 1.

Nebraska Central.—The dispatches report that "actual work" on the construction of the road began last week on that part of the road constituting the belt line between Omaha and South Omaha. The line has been surveyed and the right of way secured. The company is said to have purchased land for station and terminal facilities. Last June Douglas County, in which Omaha is situated, voted bonds to the amount of $750,000, providing that actual work began before May 1, and that condition probably has something to do with the present operations.

Nelson & Fort Sheppard.—Actual railway construction on the line began at Sayward and Nelson, B. C., on May 1, and the contract calls for completion by Oct. 1, just five months to build the 70 miles of road. It is an extension of the Spokane Falls & Northern, north into the mining region of British Columbia.

New Roads.—Arrangements have just been completed for the location of a branch line of railroad from Hillman Station on the Pennsylvania & Northwestern, in Jefferson County, to the headwaters of Clover Run, in Bell Township, Clearfield County, about six miles. A preliminary line has been run by a Mr. Henry, of Tyrone, Pa.

Norfolk & Western.—The Castle Rock branch, now building from the Winston-Salem Division, starts near mile post No. 10 from Roanoke, Va., and extends in a generally westerly direction to the property of the Castle Rock Mining Co., 2¾ miles. The grading and bridging are now well under way, and the track will be laid as as the soon roadbed is prepared.

Northern Pacific.—The agitation for the building of a branch of this road into Lewiston, Idaho, has been a matter of more or less prominence with the citizens of Lewiston ever since the extension from Pullman, Wash., was begun. Plans for completing this branch have been under discussion lately, and a committee of citizens has secured a subsidy of $75,000 and have agreed to secure the right of way if the company will complete the line this summer. The present terminus is at Juliette, north of Lewiston.

Ohio River & St. Louis.—The surveys were begun at Reevesville, Ill., last week for this road recently chartered in Illinois. The right of way has been secured to Golconda, Ill., on the Ohio River, and the grading will probably begin this month on the 15 miles of road which it is proposed to build between the two towns.

Ohio Southern.—Track-laying on the extension of the road from Springfield, northwest to Lima, O., was commenced last week, and is being pushed at the rate of half a mile a day. President Saul says the extension will be completed by July 1.

Ottawa & Parry Sound.—It is the intention of the company to complete the construction of the road as far as Renfrew, Ont., by the middle of July, to Eganville, Ont., about Sept. 1, and then as far west as possible before winter sets in. This road is the Parry Sound extension of the Canada Atlantic.

Pennsylvania.—The Midvale extension of the railroad connecting the Midvale Steel Works and other large factories at Nicetown, Pa., is almost completed, and it is thought will be ready for use in a few days. Only a single track is laid at present, but the embankments and bridge abutments are all wide enough for two tracks. The branch track is one mile long, leading from the Germantown & Chestnut Hill Division of the Pennsylvania Railroad to the Midvale Steel Works at Nicetown. The construction of the line is said to have cost $200,000.

Philadelphia & Reading.—The new connecting link between Logan Station, on the New York branch, and Olney, on the Philadelphia & Newtown Railroad, is nearing completion. The grading is finished, excepting small portions east and west of the North Penn crossing. East of the crossing over Fifth street the road is ready for the laying of track. The bridge crossing this street is a stone arch, the height of the centre arch above the level of the street being about 25 ft. in the clear. Nolan Bros. have the contract for the stone work. The bridge across Tabor street at Olney is a single-span structure. There are two iron girders, one 96 and the other 103 ft. in length. They are being placed in position by Cofrode & Saylor, the contractors. All of the bridges are built for a double-track road, but the grading is being completed for only one track at present. Beyond Crescentville, where the new road branches off from the Newtown road toward Frankford, the work is well advanced, and everything will be ready for tracklaying in June.

Pittsburgh & Lake Erie.—The prospects of the early construction of the Bridgeville & Monongahela branch from Peters Creek to Bridgeville, Pa., are said to be doubtful. The reason alleged is that the Pittsburgh & Lake Erie has an agreement with the Pennsylvania that the new line should not be extended, as is contemplated, nor any new roads built in that territory.

St. Catherines & Niagara Central.—The bonus by-law, by which the directors of the company expected to secure $125,000 in aid from the city of Hamilton, Ont., for extensions, was voted on last week, and failed to carry.

San Diego & Yuma.—President D. C. Reed and Mayor Carlson, of San Diego, Cal., spent some time in Yuma, Ariz., last week in connection with the plans for the construction of this road between San Diego, and Yuma, Ariz., about 175 miles. What was done or what is was proposed to do is not told with any definiteness in the dispatch.

State Line.—The Pennsylvania portion of the extension of the Baltimore & Ohio system, from Morgantown, W. Va., north to Uniontown, Pa., is being built under this charter. The State Line railroad begins at Uniontown, Pa., and the track is laid from that point south to Smithfield, Pa., a distance of 10.2 miles, and from Smithfield extending down Grassy Run to the Cheat River and thence down Cheat River to Point Marion, where it crosses the Cheat River, thence along the east bank of the Monongahela River to the State Line of West Virginia, at which point it makes connection with the extension of the Fairmont, Morgantown & Pittsburgh along the Monongahela River to Morgantown, W. Va., where it joins up with the operated part of the road between Morgantown and Fairmont, W. Va. The grading from Smithfield to the State Line and to Morgantown is all under contract and nearing completion. On the line is a tunnel of 400 feet, and the bridge across Cheat River, six spans, being the most important work. The distances are: Uniontown to Smithfield, 10 miles; Smithfield to State Line, 12 miles; State Line to Morgantown, 10 miles; a total distance of 32 miles. The maximum grades per mile are 64 ft. for 8,150 ft. and the maximum curves 10½ deg. The Cheat River bridge has one deck span of 54 ft.; four through spans of 135 ft., and one deck span of 85 ft.; total length, 690 ft. The other bridge-work is as follows: At George's Creek, one 50 ft. span; road spans, 26 ft. each, at different places; George's Creek trestle, 700 ft. long and 57 ft. high; Beeghly's trestle, 400 ft. long and 52 ft. high; four crossings on Grassy Run, total 280 ft.; two crossings on Grassy Run, total 140 ft., total 420 ft. One road crossing 26 ft. span; at Laurel Run, one span 70 ft.; and at West Run, one span 70 ft. The contractors for the graduation and masonry are: Bennett & Talbott, Greensburgh, Pa.; Langhorne & Allen, 101 W. Grace street, Richmond, Va.; Drake & Stratton Co., Pittsburgh, Pa.; P. H. Bennett, Fairmont, W. Va.; and Lane Bros., Esmont, Va. The tracklaying is not yet under contract. The construction work is directed by W. T. Manning, acting Chief Engineer.

State Line Connecting.—A charter was issued by the Secretary of State of West Virginia to this company last week. The principal office is to be at Wellsburg, W. Va., and the paid-up capital is $10,000. The incorporators are: R. H. Cotton, of Wellsburg, W. Va.; A. E. Succop, A. E. Viraman, R. L. McCully, L. A. McGraw, Pittsburgh, Pa. The company proposes to build a line from Wellsburg, W. Va., to the Pennsylvania State line, a distance of about 15 miles, to connect with a line projected from Pittsburgh to that point.

Staunton Belt.—The Staunton Development Co. has completed its belt line at Staunton, Va., connecting several factories with the Chesapeake & Ohio and the Baltimore & Ohio railroads.

Tampa & Thanotosassa.—President S. A. Jones, of Tampa, Fla., states that the surveys for the line are now being made from Tampa northeast to Thanotosassa, Fla., about 15 miles.

Victoria & Sidney.—The contract has been let to T. W. Patterson, of Victoria, B. C., for building this pro-

posed road on Victoria Island from Victoria north to Sidney, a distance of 16 miles.

Washington & Chesapeake Beach.—The story is printed in some of the Maryland papers that a new company is being organized to build this road between Washington. D. C., and Chesapeake Beach, about 30 miles. The contract for building the road was let last December to a responsible firm of contractors in New York, but nothing has been heard of the project since that time.

Wheeling Bridge & Terminal.—Hallock Bros., contractors for the extension of this line from Wheeling, W. Va., to Benwood, W. Va., are pushing the work rapidly. They have four gangs at work on different parts of the line, including two pile drivers. Most of the line of four miles will be upon piles and made embankments.

Wheeling & Elm Grove.—This company is making surveys for the extension of its road from Elm Grove, 2½ miles, to Triadelphia, W. Va. The extension will probably be built this summer. The road has been improved by laying heavier rails, and has put on two new locomotives larger than those heretofore in use. It now has a capacity of transporting 1,000 people an hour between Wheeling and Wheeling Park.

GENERAL RAILROAD NEWS.

Atlanta & Florida.—This road was sold at Atlanta, May 3, on the petition of the Comptroller-General for taxes due the state. It was bid in by Judge H. R. Tompkins, representing the Central Trust Company, for the bondholders, who will reorganize the road at once.

Charleston, Cincinnati & Chicago.—This road was sold at private auction at Charleston, S. C., on May 2, under a decree of the United States Circuit Court, to Charles E. Hillier, of Boston, Mass., representing bondholders, for $550,000.

Chicago, Burlington & Quincy.—The earnings for March and the quarter are reported in the following table:

Month of March:	1893.	1892.	Inc. or dec.
Gross earn	$3,367,559	$3,252,756	I. $114,803
Oper. expen	2,235,774	2,074,523	I. 161,251
Net earn	$1,131,785	$1,178,233	D. $46,448
Fixed charges	830,000	815,075	I. 14,925
Surplus	$301,785	$363,158	D. $61,373
Three months to March 31:			
Gross earn	$9,402,088	$9,329,940	I. $72,147
Oper. expen	6,484,536	6,129,233	I. 355,303
Net earn	$2,917,552	$3,200,707	D. $283,156
Fixed charges	2,490,000	2,445,225	I. 44,775
Surplus	$427,552	$755,482	D. $327,931

Cincinnati, Hamilton & Dayton.—The appeal in the case of this company vs. William R. McKeen has been dismissed by the United States Supreme Court. This case grew out of the operations of Henry S. Ives several years ago. While in control of the above railroad Ives contracted to purchase a controlling interest in the stock of the Terre Haute & Indianapolis road, owned by McKeen, and paid $889,000 on the deal. When Ives was ousted from the control of the road the directors sued to recover this sum.

Indianapolis, Decatur & Springfield.—This railroad was purchased at public auction in New York on May 3, by an agent of the Reorganization Committee for $2,410,000, and the company will be reorganized under the terms of the published plan.

Lehigh Valley.—The Board of Directors of the company have agreed that the minimum rental to be paid by the Philadelphia & Reading for its system shall be 5 per cent. a year, and that the Lehigh Valley Railroad shall receive all the net earnings on that system up to 7 per cent., and one-half of all additional net earnings thereafter. The modification is made only upon the condition that the Philadelphia & Reading re-adjustment plan shall hereafter be carried into successful operation.

The Philadelphia & Reading, lessee of this road, reports the result of the operation for the month of February, 1893, as follows:

	1893.	1892.	Inc. or dec.
Gross earn	$1,354,600	$1,429,225	D. $74,625
Oper. expenses	992,074	1,184,361	D. 192,287
Net earnings	$362,526	$244,864	I. $117,662
Three months ending Feb. 28:			
Gross earn	$4,398,170	$4,331,913	I. $66,256
Oper. expenses	3,319,521	3,536,065	D. 216,544
Net earnings	$1,078,649	$795,848	I. $282,800

New York, Lake Erie & Western.—The earnings and expenses of this company for the month of March, and for the four months of the fiscal year to March 31, are given below:

Month of March:	1893.	1892.	Inc. or dec.
Gross earnings	$2,644,650	$2,472,480	I. $172,170
Oper. expenses	1,710,995	1,602,590	I 108,405
Balance	$933,655	$869,890	I. $63,765
Proportions due to leased lines	215,096	201,656	I. 13,440
Net earnings	$718,559	$668,234	I. $50,325
Oct. 1 to March 31:			
Gross earnings	$14,820,866	$15,137,404	D. $316,538
Oper. expenses	9,967,897	10,442,092	D. 474,193
Balance	$4,852,969	$4,695,312	I. $157,655
Proportions due to leased lines	1,314,192	1,306,207	I. 7,983
Net earnings	$3,538,777	$3,389,105	I. $149,672

Pennsylvania.—The directors this week declared a semi-annual cash dividend of 2½ per cent. and an extra stock dividend of two per cent. The cash dividend declared by the company is a reduction of one-half per cent. from the last semi-annual dividend, which was three per cent., while the extra stock dividend of two per cent. is the first of the kind since 1868, when in May of that year the company declared a cash dividend of five per cent. and an extra stock dividend of three per cent. The declaration of a two per cent. stock dividend will increase the capitalization of the company in round numbers $2,540,000.

The following statement shows the earnings of the Eastern lines for the month of March:

	1893.	1892.	Inc. or Dec.
Gross earn	$6,095,891	$5,449,804	I. $646,087
Oper. expen	4,323,794	3,805,529	I. 518,265
Net earn	$1,772,097	$1,644,275	I. $127,822

Net earnings in 1891 were $1,567,425; in 1890, $1,647,271.

The Western lines in March decreased $170,094 in gross earnings, and decreased $383,760 in net earnings, a decrease in net for the system of $255,942.

Eastern lines for three months:

	1893.	1892.	Inc. or Dec.
Gross earn	$16,146,176	$15,676,642	I. $469,534
Oper. expen	12,637,422	11,385,883	I. 1,251,529
Net earn	$3,508,754	$4,290,759	D. $781,995

Net earnings in 1891 were $4,323,614; in 1890, $4,348,448.

Western lines for three months show a gross decrease of $429,821 and a net decrease of $1,057,826. The net earnings of the system for three months decreased $1,839,821.

Philadelphia & Reading.—The receivers have asked the United States Circuit Court for authority to complete improvements begun at Broad street and Lehigh avenue, Philadelphia, which include the removal of a dangerous grade crossing. Already $41,000 has been expended on the work, and the whole cost is estimated at $300,000, not including damages to property arising from change of grade, roughly estimated at $150,000. This crossing is at the intersection of the Philadelphia, Germantown & Norristown with the new elevated line to the Market street terminus.

The earnings for March are shown in the following statement, issued by the Receivers this week:

	1893.	1892.	Inc. or dec.
Gross earn	$2,059,025	$1,820,593	I. $238,432
Oper. expen	1,235,725	1,085,791	I. 149,934
Net earn	$823,300	$734,802	I. $88,498
Other income	23,040	12,698	I. 10,342
Total revenue	$846,340	$747,500	I. $98,840
Improvements		8,715	D. 8,715
Fixed charges	650,000	625,841	I. 24,159
Surplus	$196,340	$112,944	I. $83,396

The gross earnings of the Coal & Iron Co. for March were $3,173,844, an increase of $1,422,878. The net profit was $71,663 for the month. The net earnings of both companies for the month increased $159,865, and the surplus after charges was $200,003, against a surplus of $40,414, a gain of $159,589.

Railroad company for four months:			
Gross earn	$7,164,519	$7,218,103	D. $53,584
Net earn	2,619,341	3,308,161	D. 688,823
Surplus	Def. 45,025	732,362	D. 687,337

Both companies for four months show a net decrease of $849,819 and a deficit after charges of $338,436, against a surplus of $516,782, a loss of $855,218.

The contract with the Finance Company of Philadelphia under which that company handles the coal produced by the Reading will be abrogated on the termination of the receivership. The Reading Company agrees to pay the Finance Company a sum of money for the release from its engagements.

Philadelphia, Reading & New England.—The Philadelphia & Reading company defaulted on May 1 on the semi-annual interest upon the four and five per cent. bonds of this road (Poughkeepsie Bridge system), of which there are $2,500,000 outstanding. The bonds are guaranteed, both principal and interest, by the Reading company, and the default is reported to be based upon the ground that the interest has not been earned. Another report is that the payment of interest has simply been deferred pending the consideration of the reorganization scheme for the Philadelphia & Reading.

Port Royal & Augusta.—By decision of Judge Pardee, of the United States Circuit Court, and Judge Simonton, of the United States District Court, this railroad, 112 miles in length, was, as we noted last week, turned over by Receiver Comer, of the Central of Georgia, to Receiver J. H. Averill on April 25. A correspondent sends us the following account of the change of Receivership: This road has been in control of the Central company since 1881. The chief motive in holding it has been, it was alleged, for the purpose of preventing Port Royal from becoming a rival seaport to Savannah, the seaboard terminus of the Georgia Central. The change of receiverships is the result of a suit instigated by the minority stockholders of the Port Royal, backed by the state of South Carolina, on the ground that the Central of Georgia so managed the Port Royal property as to play into the hands of the former, thus illegally discriminating against Port Royal, the seaboard terminus of the road in South Carolina. Such discrimination, it was urged, was practically a violation of the charter of the leased line on the part of the Central's management, inasmuch as the charter was originally granted to the Port Royal Company for the special purpose of building up this seaport. This transfer will undoubtedly involve the transfer of the Port Royal & Western Railroad likewise from the control of the Central's receiver to Receiver Averill, who has already been appointed temporary receiver for the Western and directed by the court to make application to the United States Court to be put into possession of the same. The Western road is but an extension of the Port Royal into the interior of the state from Augusta *via* Anderson to Spartanburg, where it meets the main line of the Richmond & Danville system. The union of these two divisions brings under one management a line extending the whole width of the state, effecting, in this case, the exclusion of the Central of Georgia from South Carolina.

Richmond & West Point Terminal.—Drexel, Morgan & Co., of New York, have received deposits of a majority of all classes of Richmond Terminal securities, and will announce their plan of reorganization in a few days.

Texas & New Orleans.—The directors have called a meeting of stockholders for June 30 to authorize a mortgage to secure bonds to an amount not exceeding $4,195,000, due in 50 years and bearing five per cent. interest. These bonds, it is understood, are intended to refund the present bonded debt at a reduced rate of interest and, perhaps, also to provide funds for extension. The road is one of the Southern Pacific lines in Texas.

Toledo, Ann Arbor & North Michigan.—A bill asking for the appointment of a Receiver for the railroad was last week filed in the United States Court at Toledo, O., at the instance of the Craig Shipbuilding Co., of Cleveland. The Court appointed Wellington R. Burt, of Saginaw, Mich. Mr. Burt is the son-in-law of J. M. Ashley, the President of the road. This action of the Craigs was brought to secure the balance due on the two transfer boats, Ann Arbor No. 1 and No. 2, built by them for the road, and which transport freight cars across Lake Michigan.

Wabash.—The statement of earnings for March is as follows:

	1893.	1892.	Inc. or dec.
Gross earn	$1,135,188	$1,134,704	I. $484
Oper. exp.	825,052	861,254	D. 36,201
Net earn	$310,136	$273,450	I. $36,685
July 1, to March 31:			
Gross earn	$10,905,246	$11,257,984	D. $352,738
Oper. exp	8,171,395	8,339,044	D. 167,649
Net earn	$2,733,851	$2,918,940	D. $185,089

TRAFFIC.

Traffic Notes.

The Canadian Pacific announces that arrangements have been made for a steamship line between Vancouver, B. C., and Sydney, N. S. W.

The through night passenger train between New York and Boston over the New York & Northern and the New York & New England, was discontinued April 30.

The Pennsylvania road made no reduction in fares to the Naval Review at New York City on April 27, and the same course was pursued by the Reading. It is said that the two roads made a preliminary agreement to this effect.

The Kansas City, Memphis & Birmingham has withdrawn from the Southern Railway & Steamship Association, but the published accounts that the road was dissatisfied at some particular piece of discrimination against it are said to be unfounded.

The San Francisco *Examiner* reports that the Southern Pacific is to make a general reduction in local freight rates throughout California, and it prints a long list of rates which, it is said, the rate clerks have already figured out. The road will also adopt the Western classification for local California business.

A consignee at Charlestown, W. Va., refused two cars of bark because there was demurrage to pay and allowed them to stand until there was $69 against each car. The company then sold the bark for charges and the consignee sued the road for $500; but he was beaten and ordered to pay the road $15, the proceeds of the sale having lacked that much of paying the freight and demurrage.

Fraudulent tickets purporting to have been issued by the Sibley, Lake Bristineau & Southern have been taken up on a number of different roads in the West, and an extensive swindle seems to have been perpetrated. Press dispatches report these tickets from many different points, but the only one that has been traced, so far as reported, was sold by a scalper in Chicago. The above named road is a private line in Louisiana, and does no passenger business, but it appears that the President of the road had issued an official circular appointing some railroad man General Passenger Agent, just for fun. The tickets are on a skeleton form.

Chicago Traffic Matters.

CHICAGO, May 3, 1893.

There is no improvement in the Western passenger situation yet. The Denver & Rio Grande is apparently determined to force the fight until the Colorado Midland (Santa Fé) agrees to restore the Colorado local rates. Both roads quote a rate of $1 from Denver to Grande Junction and $2 to Trindidad. Eastbound the Denver & Rio Grande has cut the round trip rate to Chicago to $40, being $9 below the agreed rate, with corresponding reductions to St. Louis and the Missouri River, which has been met by the Santa Fé. The Santa Fé has also addressed another letter to Chairman Caldwall and intimating that it will carry into effect its threat to make corresponding rates east of the Missouri River, which means a round trip rate of about $13 from Kansas City to Chicago. The indications are that a conference will be had this week at which an agreement will be reached to restore rates.

As was to be expected, the case against the scalpers has once more fallen through, the six brokers under indictment having been released on *habeas corpus* proceedings. The case was argued before Judges Tuthill, McConnell and Dunne and the opinion was read by Judge McConnell, and the brokers released on the ground that while the law required that a ticket seller must be authorized to sell a ticket it does not follow that he must needs be authorized by the road whose ticket he sells. In the case under review the court holds that the indictments, for this reason, are bad. Thus on a technicality the roads are again defeated in their efforts to suppress the brokers.

The Central Traffic Association has moved from the Rookery to the Monadnock Block.

The Southwestern lines are met at the outset of the rehabilitation of the Southwestern Railway & Steamship Association with a disturbance in Texas rates which is considered serious enough to warrant the calling of a special meeting for May 8.

Reports from the meeting of presidents of the Joint Committee at New York last week state that the Nickel Plate withdrew its notice of withdrawal from portions of the agreement in regard to World's Fair rates and that the outlook is quite favorable for the maintenance of the agreed rates.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending April 29, amounted to 60,331 tons, against 63,699 tons during the preceding week, a decrease of 3,368 tons, and against 47,912 tons during the corresponding week of 1892. The proportions carried by each road were:

Roads.	W'k to Apl. 29.		W'k to Apl. 22.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	8,228	13.6	8,618	13.5
Wabash	3,925	6.5	3,810	6.0
Lake Shore & Michigan South.	13,457	22.3	12,168	19.1
Pitts., Ft. Wayne & Chicago	6,959	11.5	7,989	12.5
Pitts., Cin., Chicago & St. Louis	7,235	12.0	7,760	12.2
Baltimore & Ohio	3,391	5.7	3,561	5.8
Chicago & Grand Trunk	4,848	8.0	7,802	12.2
New York, Chic. & St. Louis	4,370	7.3	3,874	6.0
Chicago & Erie	5,399	9.0	5,861	9.2
C., C., C. & St. Louis	2,516	4.1	2,256	3.5
Totals	60,331	100.0	63,699	100.0

Of the above shipments 3,473 tons were flour, 31,031 tons grain and millstuff, 3,470 tons cured meats, 12,564 tons dressed beef, 862 tons butter, and 5,824 tons lumber. The three Vanderbilt lines carried 43.2 per cent., and the two Pennsylvania lines 23.5 per cent. The Lake lines carried 84,176 tons, against 279,861 tons during the preceding week, a decrease of 195,685 tons.